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Volume 23 DECEMBER 1954 Number 12

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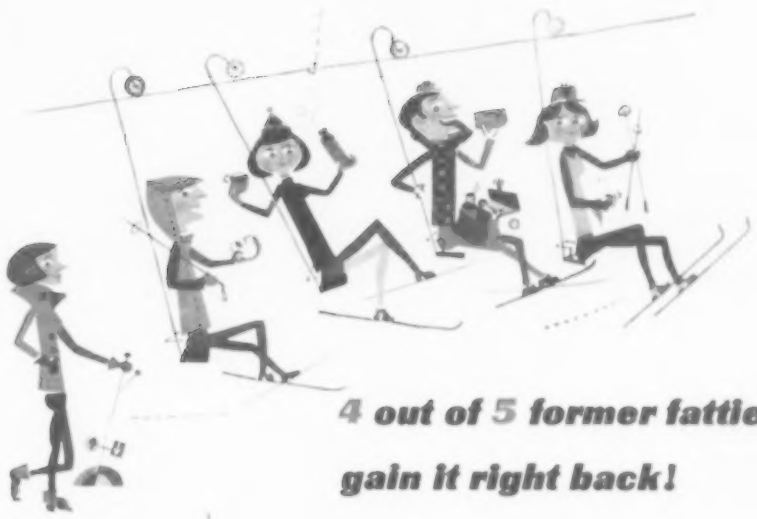

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Personal

HUGH E. CHAVERN, M.D., has been appointed Medical Director of Dravo Corporation, Neville Island, Pittsburgh. The appointment, announced November 10, 1954, is in conjunction with an expanded medical program to serve the employees of Dravo and its subsidiaries. Improved facilities are being provided in the main plant dispensary on Neville Island, and new equipment is being installed to aid pre-employment medical as well as annual health examinations. DR. CHAVERN has been with Dravo since 1952. He received his Medical Degree at the University of Pittsburgh in 1948; interned at St. Joseph's Hospital, Pittsburgh, 1948-49; and in 1954 was given the Degree of Master of Public Health in Occupational Health at the Graduate School of Public Health, University of Pittsburgh. He is on the staffs of St. Joseph's and St. Clair Memorial Hospitals, Pittsburgh. His memberships include American Medical Association, Pennsylvania Medical Association, Allegany Medical Association, and Industrial Medical Association. It was also announced that J. E. MCCLENAHAN, M.D., will continue as Chief Surgeon for the company. DR. MCCLENAHAN is on the staff of Ohio Valley General Hospital and Mercy Hospital.

EDWARD H. CARLETON, M.D., General Medical Director, Inland Steel Company, East Chicago, Indiana, addressed the Annual Meeting of the Kansas City Industrial Medical Association on December 7, at the Hotel President, on the subject "Future Trends in Industrial Medicine." He was introduced by R. EMMET KELLY, M.D., IMA District Counselor, who presided at the discussion period following DR. CARLETON'S address. December 6-8, the University of Kansas Medical Center, Kansas City, presented a course on Industrial and Occupational Medicine under the cosponsorship of the Joint Committee representing the AMA Council on Industrial Health, the American Academy of General Practice, and the Industrial Medical Association. This emphasizes the family physician's role in on-the-job injuries. CHARLES F. SHOOK, M.D., talked on "Present Concept of Industrial and Occu-

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patational Medicine"; EDWARD H. CARLETON, M.D., on "Preplacement Examinations and Periodic Health Audits"; and R. EMMET KELLY, M.D., on "Rehabilitation and Re-employment of the Cardiac Patient." Among the other speakers, MAC F. CAHAL, Executive Secretary, American Academy of General Practice, discussed "Inter-professional Relationships of the Industrial Physician and the Personal Physician."

THE PUGET SOUND Naval Shipyard at Bremerton, Washington, is a large industrial plant operated by the U. S. Navy and engaged in the conversion, repair, and maintenance of large Naval combatant vessels. It employs approximately 14,000 civilians, of whom more than 11,000 are skilled, semi-skilled, and unskilled workers. Under a recent Navy Department directive, a reduction has been made in the number of military Medical Officers assigned to industrial medical dispensaries where the work primarily concerns providing medical services to civilian employees. Accordingly, this Shipyard is seeking to employ five civilian physicians (male) on a full-time basis. For information, address E. O. LILLOREN, Acting Employment Superintendent, Puget Sound Naval Shipyard, Bremerton, Washington.

THE Annual Meeting of the New England Industrial Medical Association was held at the Bradford Hotel, Boston, November 3, 1954, at 6:00 P.M. There were 55 members present. The dinner speaker was DR. RICHARD J. CLARK, head of the Cardiac Work Classification Center at the Massachusetts General Hospital. His subject was "The Cardiac and the Problems Relating to Industry and Compensation." The newly elected Officers and Directors are listed on page 6 herein.

FREDERICK H. SHILLITO, M.D., has been appointed Medical Director of the American Can Company, New York City.

ROBERT COLLIER PAGE, M.D., who has been General Medical Director of Standard Oil Company (New Jersey) since 1946, becomes Chief Medical Consultant, and RALPH SCHNEIDER, M.D., Assistant Medical Director on DR. PAGE'S staff since 1948, becomes Jersey Standard's Medical Direc-

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RALPH SCHNEIDER, M.D., Jersey Standard's new Medical Director, graduated at Hobart College in 1931, and at the University of Rochester School of Medicine in 1935. He practor. DR. PAGE, a recognized authority on medicine in industry both in the United States and abroad, joined Jersey Standard as Assistant Medical Director in 1939 and became General Medical Director in 1946 after serving as command surgeon in the Army Air Forces with the First Commando Air Force in the China-Burma-India theater and as Chief of Professional Services, Personnel Distribution Command. A graduate of the University of Detroit in 1929 and Northwestern University Medical School in 1934, he took postgraduate training at the University of Leeds, England, and the Presbyterian Hospital, Philadelphia, before entering private practice in Oak Park and Chicago, Illinois, from 1936 through 1938. He is a Diplomate of the American Board of Internal Medicine, Fellow of the American College of Physicians, member of the New York Academy of Medicine, and Associate Clinical Professor of Industrial Medicine, New York University School of Medicine. He is also President and Fellow of the Industrial Medical Association, and Chairman of the Board of Trustees of the Occupational Health Institute. He is Co-chairman of the Medical Advisory Committee to Industry for the National Fund for Medical Education. In addition to his activities as Chief Medical Consultant to Jersey Standard, DR. PAGE will act as consultant for other industrial organizations in medicine as applied to the needs of industry.

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ticed internal medicine in New York City before World War II. In 1943, he entered the U. S. Navy and served in Naval hospitals in the United States and the South Pacific. He was placed on inactive duty as a Lieutenant Commander in 1946, and joined Jersey Standard. He was first assigned to International Petroleum Company, Limited, in Peru, to reorganize medical facilities and to train Peruvian physicians for the company's medical staff. He is a Diplomate of the American Board of Internal Medicine, a Fellow of the American College of Physicians, and a member of the American Federation for Clinical Research, and the Industrial Medical Association. He is also Assistant Clinical Professor of Industrial Medicine at New York University, and is on the medical staff of University Hospital.

THE Association of Labor-Management Medical Care Program Administrators was organized at a conference in Buffalo, New York, October 11, 1954. This is to bring together the medical and lay administrators of medical care programs sponsored by labor unions or labor-management health and welfare funds for the study and sharing of experiences, and the promotion of standards for high quality medical care. Professional consultation to unions and union-management groups will be offered. The Executive Board of the Association is composed of President, DR. MORRIS BRAND, Medical Director, Sidney Hillman Health Center, New York; Vice-President, DR. FRANK GUIDOTTI, Medical Director, Hotel Trades Health Center, New York; Secretary-Treasurer, DR. HERBERT K. ABRAMS, Medical Director, Union Health Service, Inc., Chicago, and members: DR. LORIN KERR, United Mine Workers of America Welfare and Retirement Fund; MR. ISIDORE MELAMED, Executive Director, AFL Medical Service Plan of Philadelphia; MR. JEROME POLLACK, United Auto Workers, CIO, Social Security Department; DR. WILLIAM A. SAWYER, Medical Consultant, International Association of Machinists.

RUFUS B. CRAIN, M.D., Medical Director of the Kodak Office and Camera Works of the Eastman Kodak Company will retire January 1, after 34 years of service. DR. CRAIN will be succeeded by GORDON M. HEMMETT, M.D.,

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Medical Director at the company's Hawk-Eye Works plant. FREDERICK HUGHES, M.D., of the Kodak Park Medical Department, will succeed DR. HEMMETT in the Hawk-Eye post. The new appointments were announced by JAMES H. STERNER, M.D., Kodak Medical Director, and WILLIAM T. ROACH, general manager of Hawk-Eye Works. DR. CRAIN joined the Kodak Office medical staff in 1920. He became Assistant Medical Director in 1943 and was appointed Medical Director of the Kodak Office and Camera Works Medical Departments in 1949. He is a member of the American Heart Association and a Fellow of both the American Medical Association and the Industrial Medical Association. In World War I, he was awarded the British Military Cross while serving as a captain with the British Expeditionary Force in western Europe. He received his medical degree from Albany Medical College of Union University in 1913. He later received the degree of Master of Public Health from Harvard. DR. HEMMETT, President-Elect of the Monroe County Medical Society, joined the Kodak Park Medical Staff in 1941. Two years later he

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transferred to Hawk-Eye where he set up the Medical Department on a full-time basis. He was named director of the Hawk-Eye Medical Department in 1949. DR. HEMMETT was graduated from Cornell University and McGill University. He interned at Rochester General Hospital where he served as resident physician. He is a fellow of both the Industrial Medical Association and the American Academy of Occupational Medicine, Vice-President of the Safety Council of the Rochester Chamber of Commerce and a member of the American Medical Association. DR. HUGHES was graduated in 1935 from the University of Rochester Medical School. He interned at Genesee Hospital, where he was resident physician for three years. In World War II, he was chief of the medical service in station hospitals in the European Theatre of Operations. Following the war, he returned to Rochester to take up practice in internal medicine and cardiology. He joined the Kodak Park medical staff in 1949. He is a member of the American Medical Association, the Rochester Academy of Medicine, and the Industrial Medical Association.

AT THE meeting of the Board of Directors of the Industrial Medical Association on October 17, 1954, the following were elected to honorary membership: DANIEL L. LYNCH, M.D., Roslindale, Massachusetts, President, Industrial Medical Association, 1940-41, and Medical Director, New England Telephone and Telegraph Company, 1915-48, retiring in the latter year; GILBERT M. BARRETT, M.D., of San Francisco, recently retired Medical Director, San Francisco Shipyard Division, Bethlehem Steel Corporation; and RICHARD O. SCHOFIELD, M.D., Sacramento, California, charter member of the Western Industrial Medical Association, and its President in 1946; IMA District Counselor, 1943-49; Industrial Surgeon, retired.

WILLIAM F. ASHE, M.D., returned last month from a globe-encircling Point Four mission, to assume his new duties as Professor and Chairman of the Department of Preventive Medicine at Ohio State University. He was formerly on the industrial medicine teaching staff at the University of Cincinnati and more recently was Chief of Internal Medicine at the Holzer Clinic in Gallipolis, Ohio. He flew to India in September to act as a consultant in thermal environmental health, attached to the Technical Cooperation Mission of the Foreign Operations Administration in New Delhi. In that capacity he served as an adviser to the Ministries of Labor and Health of the Indian Central Government. The purpose of his mission was to assist government officials in the solution of worker health and productivity problems resulting from the "heat loads" in India's industrial plants. The majority of these plants are located in the southern part of India, where temperatures sometimes rise above 110° F in the dry seasons. During the monsoon season, though temperatures may drop to the nineties, humidities approach the saturation point.

CHARLES E. DUTCHESS, M.D., became a Consultant to Schenley Laboratories, Inc., and to the drug and chemical industry, on December 1. DR. DUTCHESS was formerly Vice-President and Medical Director of Schenley, and for the past 10 years he has supervised clinical investigations and professional relations. These functions are now under the direction of B. MARR LANMAN, M.D., who was named head of clinical research for the drug firm. DR. DUTCHESS has been in pharmaceutical work for the past 22 years. After practicing private medicine in Detroit, starting in 1921, he joined the professional service and advertising department of Parke, Davis & Company in 1932 and remained until 1944 when he began his association with Schenley Laboratories. Recently appointed Chairman of the Medical-Surgical Advisory committee of the National Security Industrial Association, DR. DUTCHESS is also a fellow of the American Medical Association, Past-President of the Association of Medical Directors, and Chairman of the Committee on Geriatrics and Retirement of the Industrial Medical Association.

MILO H. FRITZ, M.D., of Anchorage, is one of the three ophthalmologists in the Territory of Alaska. At a meeting of the Alaskan Territorial Medical Association at McKinley Park late in August, he presented a paper on "Industrial Ophthalmology." HEDWIG S. KUHN, M.D., participated in the discussion following his paper. She writes that the Alaskan Association members are "a most interesting group of doctors who are really doing frontier medicine and a wonderful job."

THE COMMITTEE on Industrial Health of the Illinois State Medical Society, of which FREDERICK SLOBE, M.D., is Chairman, and MILTON H. KRONENBERG, M.D., Vice-Chairman, has the following members: RICHARD J. BENNETT, JR., M.D., JOSEPH H. CHIVERS, M.D.; JAMES H. HUTTON, M.D.; JAMES D. MAJARAKIS, M.D., CARL T. OLSON, M.D.; JOSEPH F. O'MALLEY, M.D.; CARL M. PETERSON, M.D.; EDWARD A. PISZCZEK, M.D.; V. P. SIEGEL, M.D.; F. LEE STONE, M.D.; MYRON J. TERMAINE, M.D.—together with MRS. MARJORIE W. GRIGSBY, HAROLD M. CAMP, M.D., and MR. JAMES LEARY.

INDUSTRIAL Medical Association of New Jersey held a meeting November 19, 1954, at Johnson and Johnson Research Center, New Brunswick, New Jersey. GOVERNOR ROBERT B. MEYNER, of the State of New Jersey, attended the meeting and made a speech. He closed as follows: "Private industry is pointing the way, not only to better health through continued research, but to means of enjoying the fruits of new medical discoveries, the services of good physicians and surgeons, and the large and growing hospital facilities of America. An alert state government, in the performance of its functions, with sights up and a desire to improve the health of its people, is working with your profession in this task. I can assure you that such is both the policy and program of this state administration in New Jersey."

THE Committees on Industrial Health of the State Medical Societies are meeting with a nice measure of success in their endeavor to get more articles on industrial medical subjects in the State Medical Journals. Among the current publications, *Illinois Medical Journal* for November, 1954, has a study by LEONARD F. WEBER, M.D., of Chicago, on "Industrial Dermatitis," and an explanation by RUTHERFORD T. JOHNSTONE, M.D., of Los Angeles, as to "What Every Doctor Should Know About Solvents." And *Ohio State Medical Journal* for November has "an excellent article on Occupational Diseases" by THOMAS F. MANCUSO, M.D.

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NILS PAUL LARSEN, M.D., writes interestingly about the Annual Meeting of the Territorial Association of Plantation Physicians, at Kaneohe Bay, Oahu, T. H., October 11-12, 1954. ERNIE BURGESS, M.D., of Seattle, spoke on "The Treatment of Industrial Fractures by the General Practitioner"; FRED REICHERT, M.D., of Stanford University, on "Use of Deep Injection"; WILLIAM STEVENS, M.D., T. H., on "Methods of Psychotherapy"; and RAYMOND W. MCNEALY, M.D., Chicago, on "Diagnosis of Acute Abdominal Conditions." At 3:00 P.M., October 11, the Marine Corps Air Station exercises at Kaneohe Bay impressively demonstrated "the close cooperation between the directors of the operation, the men in the field leading the attack, as well as the close connection with a group of jet planes that were hiding up above the clouds. When the infantry called for those jet planes to hit an obstructing target, it was amazing to see them come out of the skies at 450 miles an hour and one after another drop their bombs right in the middle of the target . . . . I wish the whole of America could have seen this training exercise which the Marines apparently are put through at more or less regular intervals so that every man will have the experience of knowing not only just what he is supposed to do but also how well all the different groups are synchronized. One of the final scenes in this drama was the coming in of a helicopter which picked up a wounded man and took him off and then came back and demonstrated its amazing maneuverability. It actually seemed to do a regular hula right in front of us, with gyrations in every direction."

GUIDING Principles of Occupational Medicine," published by the Council on Industrial Health of the American Medical Association, is "must reading" for physicians who do industrial medicine. Concisely stated in six readable pages. Obtain from Council on Industrial Health, American Medical Association, 535 North Dearborn Street, Chicago 10.

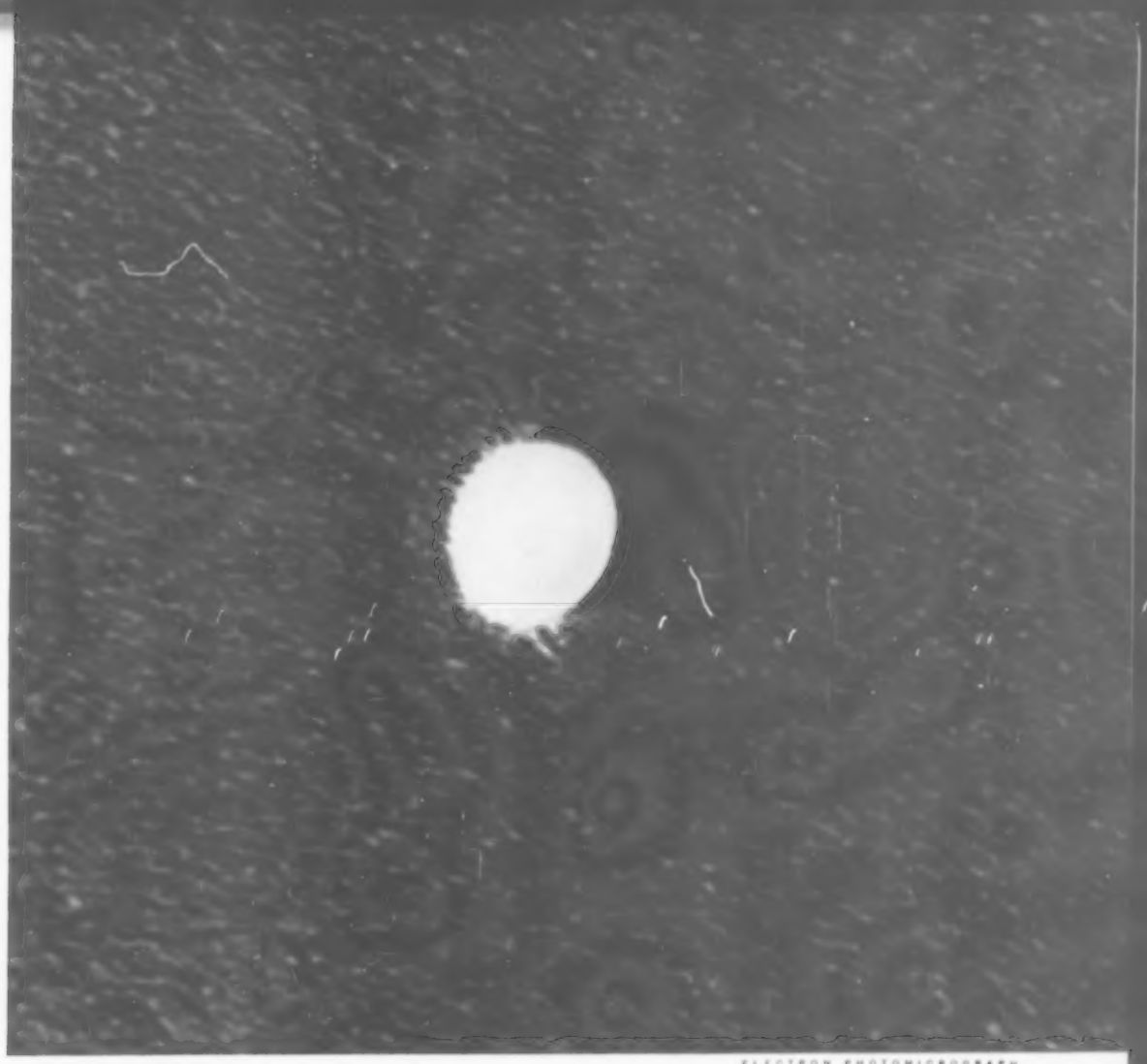
Recent Deaths

DAVID C. STRAUS, M.D., 72, former Chicago physician and surgeon, November 10, in Pueblo, Colorado. DR. STRAUS had been Medical Director of Pueblo Ordnance Depot for the last three years. He was a graduate of Rush Medical College and had served on the staff of Michael Reese Hospital; had been Director, Hygiene Division, State of Illinois Department of Labor; left Chicago about 10 years ago, and was Chief Surgeon of the Clinic Hospital, Michigan City, Indiana, for seven years before going to Pueblo. Member of the Industrial Medical Association since 1933.

HARRY VAN NESS SPAULDING, M.D., 69, in Phoenix, Arizona, October 20. DR. SPAULDING practiced traumatic surgery for many New York City area companies. He was a member of the American College of Surgeons; a staff member of several hospitals in the New York area; Regional Medical Director of the Baltimore and Ohio and the Erie Railroads; consulting examiner for many railroad and shipping companies; Medical Director of the General Accident Insurance Company; and one of the original members of the New York State Society of Industrial Medicine, for many years taking a leading part in its activities. He was a Fellow of the Industrial Medical Association.

LEWIS RYERS THOMPSON, M.D., 71, former Assistant Surgeon General of the U. S. Public Health Service, November 12, in a Baltimore hospital. In 36 years with the Service, DR. THOMPSON also served as Director of the National Institutes of Health and Chief of the Bureau of State Services. He retired eight years ago. He was a native of Lafayette, Indiana; had been a Fellow of the Industrial Medical Association since June, 1931.

Industrial Hygiene Foundation's Exhibit showing the tools for gearing an industrial health program to the needs of management and the worker, and the benefits that accrue to the individual, industry, and the community from such a program (See page 543).



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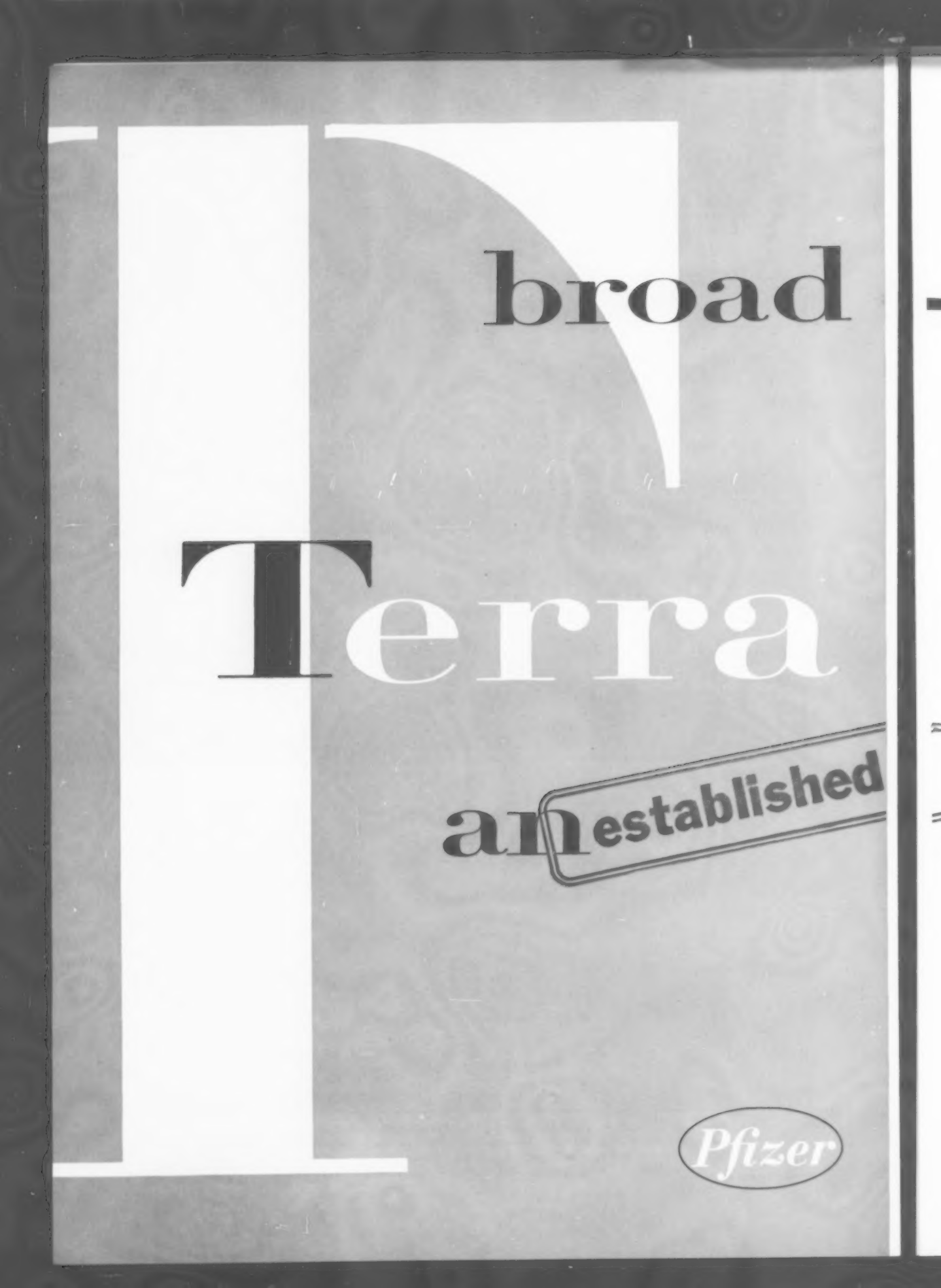
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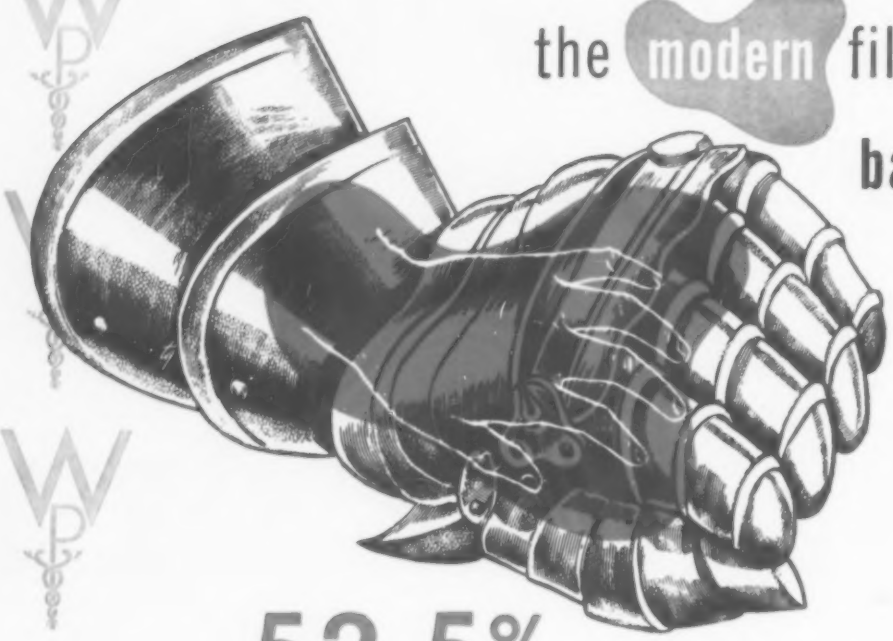

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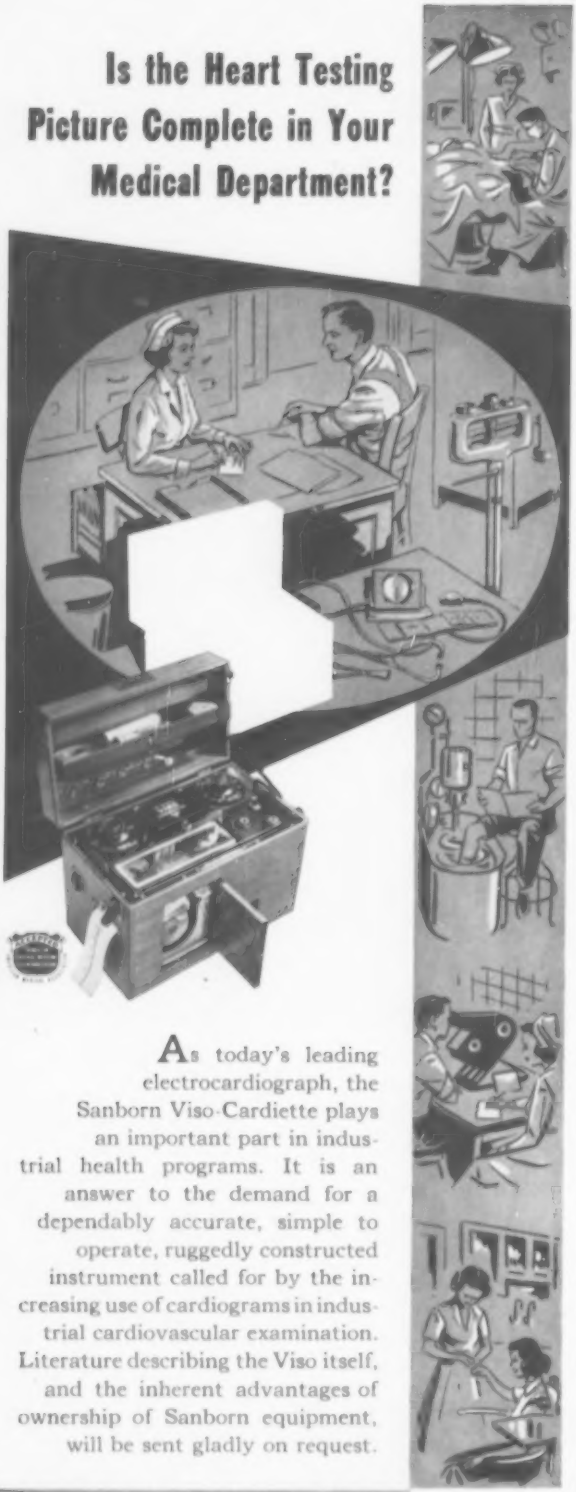

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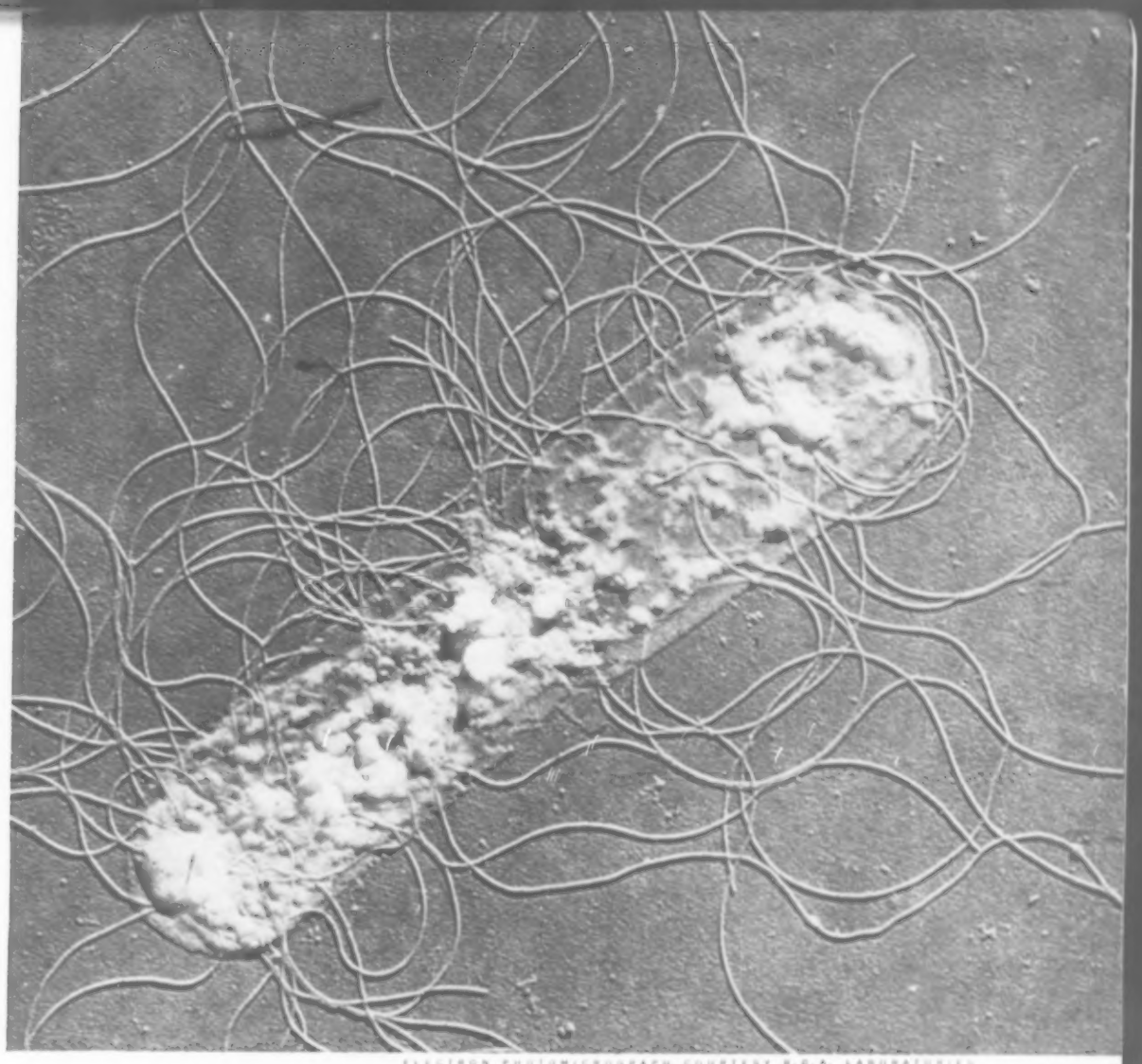

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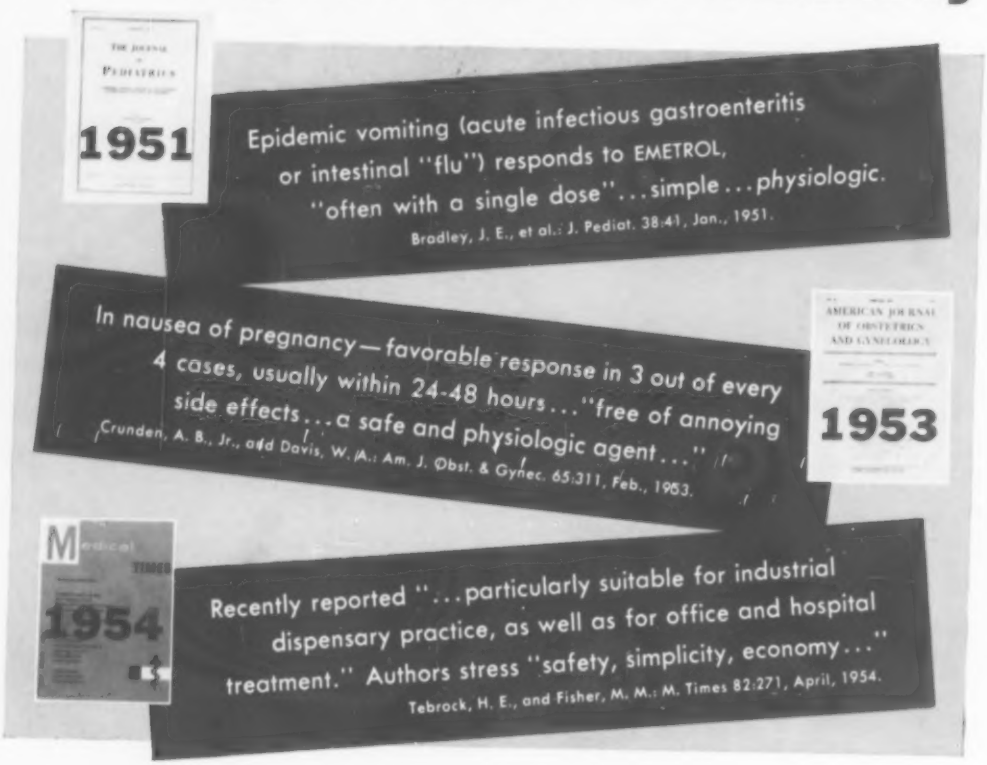
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Epidemic vomiting (acute infectious gastroenteritis or intestinal "flu") responds to EMETROL, "often with a single dose"... simple... physiologic.
Bradley, J. E., et al.: J. Pediat. 38:41, Jan., 1951.
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Crunden, A. B., Jr., and Davis, W. A.: Am. J. Obst. & Gynec. 65:311, Feb., 1953.
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Recently reported "...particularly suitable for industrial dispensary practice, as well as for office and hospital treatment." Authors stress "safety, simplicity, economy..."
Tebrock, H. E., and Fisher, M. M.: M. Times 82:271, April, 1954.

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Levenstein, I.: Report of Lehrco Laboratories, Roselle Park, N. J.

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Thenfadil® hydrochloride	4.0 mg.
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Potassium guaiacol sulfonate	70.0 mg.
Ammonium chloride	70.0 mg.
Menthol	1.0 mg.
Chloroform	0.0166 cc.
Alcohol	8%

**Exempt narcotic*

DOSAGE:

Adults—1 or 2 teaspoonfuls every two to four hours, not to exceed 5 doses in twenty-four hours.

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1. Bonyal, A. L.: Management of Cough in Daily Practice, *J. A. M. A.*, 148:501, Feb. 16, 1952.

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ELECTRON PHOTOMICROGRAPH

Klebsiella pneumoniae 39,000 X

Klebsiella pneumoniae (Friedländer's bacillus) is a Gram negative, capsulated organism commonly involved in various pathologic conditions of the nose and accessory sinuses, in addition to bronchopneumonia and bronchiectasis.

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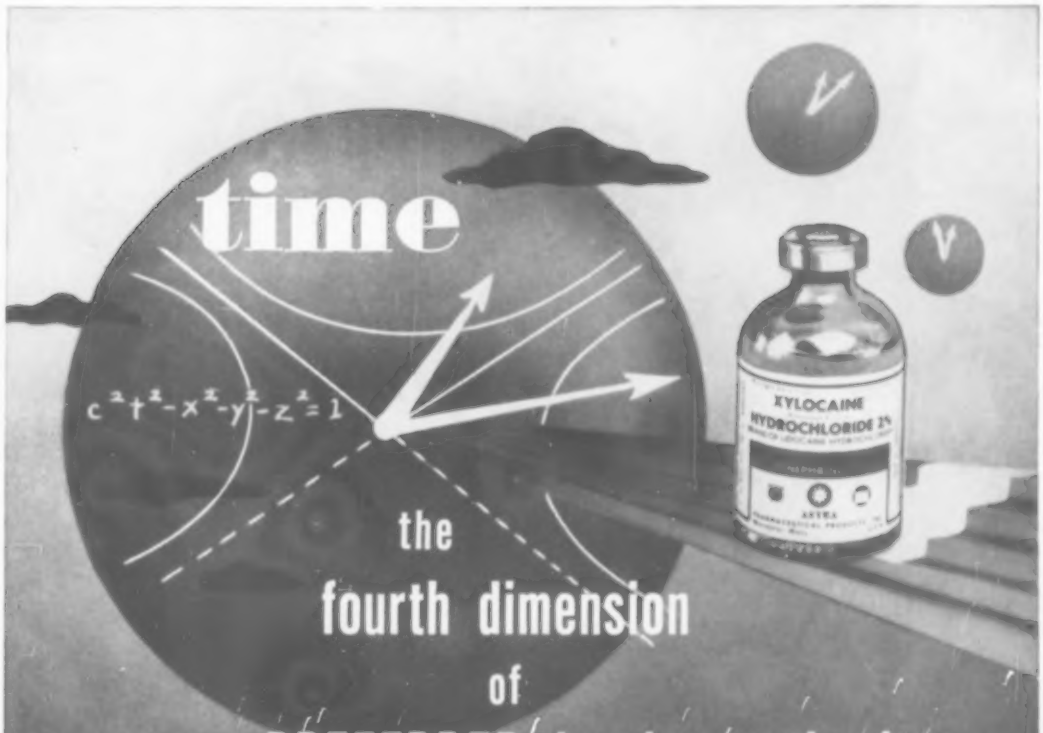

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1. Grayzel, H. G., Heimer, C. B., and Grayzel, R. W.: New York St. J. M. 53:2233, 1953.
2. Heimer, C. B., Grayzel, H. G., and Kramer, B.: Archives of Pediatrics 68:382, 1951.
3. Behrman, H. T., Combes, F. C., Bobroff, A., and Leviticus, R.: Ind. Med. & Surgery 18:512, 1949.
4. Turell, R.: New York St. J. M. 50:2282, 1950.

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INDUSTRIAL MEDICINE AND SURGERY

DECEMBER, 1954

Industrial Antimony Poisoning

HEINRICH BRIEGER, M.D., CHARLES W. SEMISCH, III, M.D.
JOSEPH STASNEY, M.D., and DOROTHY A. PIATNEK, M.A.
Division of Industrial Medicine, Department of Medicine and Department of Pathology
The Jefferson Medical College of Philadelphia

THIS study on industrial antimony poisoning was suggested by observations made in a plant of the abrasives industry where resinoid grinding wheels are manufactured. The work consists of mixing, molding and pressing inert abrasive granules with binder and additives, and takes place in an air-conditioned room. Drying is done in a separate kiln room. The activities in the latter are considered strenuous; otherwise, the physical strain is not excessive. A variety of mixtures is used for the manufacture of the wheels; during the period in question, most wheels were produced from phenol formaldehyde resin and antimony trisulfide. The latter had replaced lead for safety reasons.

One hundred and twenty-five workmen were exposed to this environment for eight months to two years. During this period, six employees died suddenly in addition to two other employees who died of chronic heart disease. During the preceding 16 years, only one death (coronary thrombosis) had occurred among the workers in this department. Four of the deceased were under 45 years of age. Since no autopsies were performed, the causes of death could not be determined definitely, but in all but one case heart disease was suspected.

Interest became focused on the possibility of an occupational disease. A toxicologic survey of the materials dispersed in the air directed attention to antimony trisulfide. Air tests using Fredrick's method[1] revealed the presence of 0.58 to 5.5 mg./cu. m., with the majority of the findings over 3.0 mg./cu. m.

One hundred and thirteen employees were thoroughly examined; a special study of the cardiovascular system was made on the 10 men who had been most heavily exposed. Of all men examined, 14 had a blood pressure of over 150/90 mm., and 24 of under 110/70 mm.; 37 out of 75 examined showed changes in the electrocardiogram, mostly of the T-waves, which were considered significant by a cardiologist. Since a large number of the employees complained about gastrointestinal disturbances, an x-ray study was made. It revealed an incidence of ulcer in seven of 111 persons examined (63 per 1,000) as compared with 59 known cases of ulcer in the total plant population of 3,912 (15 per 1,000). No other disorders which might be expected from exposure to antimony, including irritation of the skin, mucous membranes and respiratory tract, were found. Urine samples collected at random and examined by a procedure adapted from Fredrick's method[1] contained 0.8 to 9.6 mg. of antimony per liter.

The use of antimony trisulfide has since been abandoned. No further death from heart disease or abnormal increase of cardiovascular disorders has been observed in the department for several years. However, the electrocardiographic changes in 12 of 56 re-examined employees have shown a tendency to persist.

THE literature on industrial antimony poisoning reviewed recently by Renes[2] deals mostly with exposure to mixed air contaminants, and many of the signs and symptoms attributed to antimony poisoning are rather vague. This is true, for instance, of the blood changes mentioned by several authors. Generally recognized effects of exposure to inorganic antimony appear to be irritation of the skin and mucous membranes, including those of the respiratory and of the intestinal tracts. Renes[2] has reported that 5.5% of the workers employed in an antimony smelter had pneumonitis due to the inhalation of antimony trioxide. Corresponding findings in animals have been published. Extensive pneumonitis in guinea pigs exposed to antimony trioxide has been described,[3] and chronic lipoid pneumonia in rats after long-extended exposure to the same compound in finely divided form.[4] It is interesting to note that pulmonary inflammation has been observed also as a frequent sequel to intramuscular administration of antimony compounds.[5]

Injury to the heart has been seen in animal experiments,[6-10] with Bradley and Fredrick's paper[10] presenting rather conclusive results. However, these reports have not aroused much attention. Toxic effects on the cardiovascular system following the therapeutic use of antimony preparations have long been known, but they have been studied systematically only recently.[11-14] Relative-

Presented at the Eleventh International Congress on Industrial Medicine, Naples, Italy, September 13-19, 1954.

ly large groups of patients have been examined, especially by Schroeder *et al*,[13] and a high percentage of electrocardiographic changes, especially in the T-waves, has been noted. Return to normal was prolonged up to two months after the termination of the treatment. In only a few cases of occupational exposure has attention been paid to possible injury to the heart. No clinical or electrocardiographic evidence of such injury has been found.[3,15]

In most exposures of men or animals, antimony oxides, especially trioxide, were the agents in question. The industrial workers to whom this paper has referred were exposed to antimony trisulfide. According to Fairhall and Hyslop,[16] the relative order of toxicity of industrially used antimony compounds is, beginning with the most toxic, metallic antimony, antimony trisulfide, antimony pentasulfide, antimony trioxide, and antimony pentoxide. However, in men exposed to antimony trisulfide, only occasional dermatitis has been seen.[17,18] Bulmer and Johnston[15] believe that the negative results of their investigation were due to the large size of the dust particles.

In view of the observation of cardiovascular disorders in a large number of workers exposed to antimony trisulfide, it appeared desirable to study the correlation between inhalation of antimony trisulfide and heart disease in animal experiments. Rats, rabbits and dogs were exposed to the dust of the same preparation which had been used in the plant. The majority of the particles at the height of nose and mouth of the animals measured 2μ and less. For the determination of antimony in the air, the micromethod developed by Webster and Fairhall,[19] adapted to the solid substance, was used. Antimony in the urine was determined by the methods published by Fredrick[1] and by Maren[20]; the results were not entirely satisfactory.

Ten male Wistar-strain rats were exposed to approximately 3.07 mg./cu. m. for six weeks, five days a week, seven hours a day. All animals survived the exposure; appearance and weight gain remained essentially normal throughout the experiment. Definite and consistent changes in the EKG were observed in all animals exposed. The changes consisted chiefly in elevations of the RS-T segments in all leads, with depressions observed in two instances; occasional low voltage of the QRS complexes was noted; T-waves were frequently flattened, mostly in Lead I, less often in Leads II and III. These changes were more pronounced on the last examination before the termination of the experiment than on the interim examinations. On autopsy, the hearts of two rats were dilated due to the flabbiness of the myocardium, while the hearts of the other animals appeared normal. The lung showed slight pathologic changes in all animals, consisting of varying mild degrees of congestion and focal areas of hemorrhage. The histologic picture of the heart showed slight to moderate hyperemia. In nine of the 10 rats, parenchymatous changes were noted. These consisted of barely noticeable swelling of the muscle fibers in five rats and more marked changes with some granulation of the cytoplasm and the presence of focal collection of inflammatory cells in the remaining four rats. These changes were regarded as degenerative changes. The inflammatory cells present, however, were too few to suggest a definite inflammation; the presence of these cells could be explained as a sign of early and very mild inflammation or reaction to the focalized degenerative changes of the myocardium. The congestion of the lung was of the venous type and secondary to the failing heart. However, in no instance was hemosiderosis noted.

Six male rabbits were exposed to approximately 5.6 mg./cu. m. for six weeks, five days a week, seven hours a day. All animals survived. No signs of intoxication were observed while the animals were alive. Blood sugar and blood urea nitrogen remained within the range of normal; liver function tests did not suggest a disorder; the blood picture was not changed essentially; the blood pressure was neither increased nor decreased significantly. Electrocardiographic examinations indicated slight or moderate myocardial damage with a tendency to progress; again, the T-waves were especially affected. The examination of the urine for antimony did not yield reliable figures. The most pertinent autopsy finding was a marked dilation of the heart; the myocardium was very flabby and red-brown. The histologic examination revealed swelling of the myocardial fibers and the presence of cytoplasmic granules with good nuclear staining. Changes in the tissue of the other organs were of doubtful significance.

Two female dogs were exposed to approximately 5.32 mg./cu. m. for a period of seven weeks, five days a week, seven hours a day. The animals survived the exposure and appeared essentially normal; their weight remained unchanged. No definite or consistent changes in the EKG were observed. The results of biochemical and hematologic examinations did not deviate significantly from the pre-exposure findings. Prior to exposure, the urine of the animals contained only approximately 0.014 and 0.0183 mg. of antimony/100 ml., respectively. At the end of the experiment, the urinary excretion of antimony, determined after one day's exposure, had increased to approximately 0.105 and 0.112 mg./100 ml., respectively; even higher values were observed during the experiment.

Two female dogs were exposed to approximately 5.55 mg./cu. m. for a period of 10 weeks, five days a week, seven hours a day. The animals survived the exposure and appeared essentially normal; their weight remained unchanged. Electrocardiographic examination suggested some myocardial injury. Biochemical and hematologic findings after exposure corresponded to the pre-exposure findings. The concentration of antimony in the urine increased from approximately 0.017 to 1.585 mg./100 ml. (dog No. 3), and from approximately 0.043 to 1.795 mg./100 ml. (dog No. 4).

No pertinent pathologic gross findings were

present in any of the parenchymatous organs of the four dogs. The histologic picture of the myocardium showed slight changes characterized by the occasional swelling of the myocardial fibers with granular cytoplasm but good nuclear staining. Although the tissues of these animals were fixed shortly after death, the possibility of early autolytic changes has to be considered.

In an additional experiment, five rabbits were exposed to the excessively high concentration of 27.8 mg./cu. m. for five days. All animals survived. The EKG of three animals indicated myocardial changes or coronary inadequacy. Slight or moderate parenchymatous changes of the myocardium were in evidence. There was also slight parenchymatous degeneration in the liver of all animals and of the tubular epithelium of the kidney in three animals. Inflammatory processes, with and without pigment deposits, were present in the lungs.

The results of these experiments demonstrate that rats and rabbits exposed to antimony trisulfide in a concentration of 3.07-5.6 mg./cu. m. (MAC 0.5 mg./cu. m.) for six weeks developed definite and consistent functional disorders of the heart and parenchymatous degeneration of the myocardium. These findings were not as definite and consistent in dogs; however, the latter had been allowed to survive the experiment for several weeks. These results correspond to the observations made on workers exposed to the same concentrations of antimony trisulfide over a period of eight months to two years.

While antimony trisulfide was the noxious agent referred to in this paper, previously published animal experiments show that other inorganic antimony compounds are capable of producing similar injuries to the heart. However, it cannot be stated at present whether Fairhall's relative order of toxicity applies also to this particular toxic effect.

WITH the use of antimony in the manufacture of fireproof materials expected to increase, new hazards may be added to the existing ones. As the example discussed in this report demonstrates, air-conditioning does not render regular air tests unnecessary, especially not if the air supply consists partly of recirculated air. The presently accepted MAC of 0.5 mg./cu. m. appears reasonable. The in-plant observations on men and the results of the animal experiments referred to in this paper show that injury to the heart may remain undetected for long periods of time if special attention is not given to this organ. Periodic electrocardiographic examinations should be added to the routine methods wherever exposure to appreciable concentrations of antimony in the air takes place. The high incidence of gastrointestinal ulcer in an exposed plant population requires further investigation.

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Caduceus

THE symbol of the serpent, the "caduceus" of the medical profession, dates back to at least 4,000 B.C. Aesculapius, the son of Apollo, was known as the Roman god of healing. When Aesculapius was a youth, the centaur Chiron taught him the art of medicine. He became so skilled that he could restore the dead to life, according to legend. In art, Aesculapius is represented as a strong, earnest youth bearing a knotted staff. Around the staff, called a caduceus, is entwined a serpent. In ancient days the serpent was the symbol of health, because it could shed its skin and appear young again. The staff and serpent is a familiar insignia of medicine today.

—*Med. Technicians Bull.*, 5:129 (May-June), 1954, as quoted in *Physician's Bulletin*, 19:9 (October), 1954.

Industrial Heat-Load Problems in India

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THE author recently visited India as a consultant in thermal environmental health problems to the Central Government of India. My American Colleagues in Industrial Medicine and Hygiene may be interested in what is going on.

India is a hot country. Each year most areas experience extremes of hot dry weather in the early spring and summer. Temperatures of 110° F and better are not uncommon. In the late summer many areas experience the monsoon and have temperatures in the nineties with humidities often approximately 100%. As most of you know the chief limiting factor to work in hot environments (after proper acclimatization, proper fluid, and salt balance) is the wet-bulb temperatures. As long as there is a reasonable differential between body temperature and the wet-bulb temperature to allow for evaporative cooling, heavy work can be done without serious danger to health up to at least 120° F. Comfort is, of course, another matter—to be discussed later.

India is industrializing rapidly. When one adds hot mills to an already hot country he promptly runs into trouble with thermal environmental conditions affecting workers.

Textiles (cotton and jute principally) constitute the largest single industry in India at present. Artificial humidification of the work rooms, especially for spinning and weaving, is a technical necessity for optimum handling of fibers on the machines. Frequently this is done with live steam, and commonly with cold water and an atomizer-fan gadget. After weeks of this procedure, plus hot weather in stone or concrete buildings, the wet-bulb temperatures of working areas get up to levels incompatible with long continued survival to say nothing of optimum productivity. For the most part labor tries to solve its own problem by going out for a "breather" at very frequent intervals, but heat casualties and occasional deaths do occur. Manufacturers probably cannot afford industry-wide air conditioning in the already established mills (over 250 of them employing from 1000 to 8000 men each). Health safety codes, applicable to the U.K. or U.S.A., don't fit in India because the climatic conditions themselves often exceed our maximal allowable in-plant temperatures.

Steel mills and foundries with their high radiant heat loads, plus high ambiant temperatures, present another serious problem, and heat casualties are admittedly quite common.

The problem around the driers and calendar stacks of paper mills presents both the textile type of problem and the steel-mill type. Aluminum plant pot rooms, rubber and glass factories, etc., present interesting variations of the same type of problem.

Indian authorities in the Ministries of Labor and Health are much concerned and want to do something about it. One cannot be certain that the upper safe limits of heat loads which apply to healthy well acclimatized American soldiers doing hard work under controlled conditions also apply to Indian laborers. On the one hand one might expect better heat tolerance by virtue of generations of acclimatization. On the other hand lower tolerance is possible because of malnutrition, intercurrent disease, and the ultimate fatigue which comes when stress is carried too long.

It is obvious then, that certain basic studies must be repeated in relation to Indian workers. In addition to his tolerance to heat, his water drinking habits must be known, his mineral metabolism and his productivity in relation to effective temperatures which are safe but uncomfortable. (Note: There are 1000 available job seekers each morning for every available job.)

Working with Indian authorities, a series of studies have been planned which will define these problems accurately. Edward J. Largent, Research Associate of the Kettering Laboratory of Applied Physiology of the University of Cincinnati, will spend two years in India supervising these studies.

Climatic maps of India for the months of April through October are being made. Superimposed on them is an industrial map of India. From the two, sites will be selected to collect in-plant thermal data in all types of industry. Temperature, humidity, air movement, and radiation (where indicated) will be measured throughout two hot seasons. Seasonal accident rate and absentee data are being collected. In some plants it will be possible to get accurate production figures for comparable machines by seasons.

At the Ahmedabad Textile Industries Research Association Laboratories a psychrometric chamber is being set up where heat tolerance, water balance, salt balance, productivity in relation to effective temperature, etc., will be studied.

At the All India Institute of Hygiene and Public Health in Calcutta additional physiological studies will be made on work loads in relation to temperature.

The Borderlands of Heart Disease

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PROBABLY in no field of practice is one so constantly reminded that medicine is not an exact science as in clinical cardiology. Although the electrocardiograph, the x-ray and the sphygmomanometer are instruments of precision, it does not necessarily follow that the information they convey is correspondingly precise. The dividing line between the normal and abnormal in almost all the signs and symptoms accompanying heart disease is not a sharp one, and the cardiologist daily faces the problem of deciding whether symptoms such as pain and palpitation, or findings such as murmurs or electrocardiographic changes, are normal variants or due to organic heart disease.

In clinical practice one can, as a rule, straddle such questions but in examination of candidates for life insurance, military service, or employment an immediate decision is imperative and the problem of the borderline is a most important issue.

The large volume of data and follow-up available in life insurance organizations is uniquely suited to the investigation of various cardiovascular abnormalities. It is the purpose of this presentation to summarize studies carried out in the Medical Department of the Equitable Life Assurance Society of the United States on insurance applicants which pertain to such specific problems as blood pressure, heart size, electrocardiographic abnormalities particularly as they relate to coronary disease and certain cardiac arrhythmias.

Blood Pressure

PROBABLY the best criterion of what constitutes an abnormal blood pressure is that level at which mortality experience exceeds the predicted average mortality of the population. The comprehensive study made in 1939 by the Joint Committee of The Association of Life Insurance Medical Directors and the Actuarial Society of America demonstrated conclusively that levels of blood pressure above 140 systolic and 90 diastolic are definitely abnormal at any age and that the actual exceeds the expected mortality in rapidly rising ratio for systolic or diastolic values above this level. A finding of extreme interest which has been noted previously in actuarial studies, is that the mortality varies with the level of the blood pressure at lower levels too; i.e., that the life expectancy in subjects with blood pressure below average value is decidedly better than the life expectancy of the average population, and that fewer deaths from cardiovascular disease occur in this group. This was brought out even more strikingly in the recent study of Hunter which showed that with the systolic pressure 22 to 18 mm. less than average the ratio of actual to expected number of deaths was only 71% of the expected. Each small increment in the blood pressure above this was associated with a decreased life expectancy as compared with this favorable ratio. Values in excess of the low optimal level impose an increasing strain on the cardiovascular system even in the range which has always been regarded as normal simply because these are the most common levels. Actually, then, hypertension merges imperceptibly with normal values of the blood pressure and except for the distinctive changes in the arterioles consequent to extreme elevation of the blood pressure in the malignant phase, hypertension is not a disease but merely a condition which places somewhat greater strain on the cardiovascular system than exists in the average person producing identical but accelerated and accentuated effects. The arteriosclerotic changes in the large arteries are in no way qualitatively different in hypertension from the arteriosclerosis in the coronary arteries and aorta which develop in the absence of hypertension but the elevated blood pressure accentuates the development of these lesions.

Arteriosclerosis similar to that observed in hypertension likewise develops in subjects with normal blood pressure particularly in the renal arterioles but the changes are definitely accentuated in hypertension in relation to its degree.

Apart from the problem as to just what level of arterial pressure constitutes a state of hypertension is the question of determining the true level of the blood pressure in any one person. The level of the blood pressure fluctuates greatly both in normal subjects and in those with hypertension so that casual readings may be misleading. This is a very important consideration both in the diagnosis of hypertension and in the evaluation of various therapeutic measures which may be prescribed for the patient. It is preferable to record the blood pressure in terms of its maximum and minimum range rather than as casual readings. Various pressor and depressor tests have been devised, the best known of which are

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the cold pressor tests to obtain the ceiling level of blood pressure and the sodium amytal depressor test to obtain the basal level of blood pressure. Since these tests require meticulous attention to detail and fairly prolonged observation, they are not particularly well suited as an office procedure. The simplest of the pressor tests is apnea, i.e., breath-holding in expiration, and of the depressor tests, hyperventilation and carotid sinus pressure. A few years ago we reported a study emphasizing the utilization of these procedures as a routine office technique in the work-up of subjects with hypertension.

The following is an outline of the procedure we employ:

After recording the initial blood pressure the subject is instructed to stop breathing at the end of the normal expiration without straining. After 20 seconds of apnea the systolic pressure is recorded. The subject is then permitted to breath normally for a few moments and the apnea test is again repeated; at this time the highest diastolic level is recorded after 20 seconds of apnea. Most persons find it difficult to refrain from breathing for more than 30 seconds when respiration is suspended in expiration, and because of the rapid changes in blood pressure it is preferable to observe the systolic and diastolic rise on separate tests. Because of the difficulties some persons, particularly older subjects, experience in maintaining apnea for a sufficient time to record blood pressure changes, an additional simple test may be employed. A piece of gauze saturated with aromatic spirits of ammonia is held over the nose and the blood pressure is determined during brief inhalations of this irritant. This test has an advantage over the breath-holding test in that it does not require cooperation and the pressor response is not so transient as with the breath-holding test so that the rise in blood pressure may be more accurately recorded.

After performing the pressor test the subject is instructed to breath maximally with deep inhalations and exhalations at a slightly rapid rate without effort or straining. The blood pressure is recorded after 30 to 60 seconds of hyperventilation. With the patient still breathing deeply digital pressure is applied over the carotid sinus on the *left side* and the lowest blood pressure obtained during the next half minute is recorded. The patient should be apprised as to the nature of the carotid pressure test before it is carried out so that a psychic reaction to neck pressure is avoided. The depressor response following carotid sinus pressure occasionally persists for several minutes and therefore the pressor response should be tested first. The maximum and minimum levels obtained during the pressor and depressor tests are recorded, e.g., as 208/133 maximum, 157/94 minimum. Because of occasional significant differences in blood pressure in the two arms all readings should be made in the same arm, preferably the right. This entire test occupies less than five minutes and no preparation is necessary. The pressor response with apnea in a large series of cases was found to be practically identical with the response to the cold pressor test. Likewise the depressor test of combined hyperventilation and carotid sinus pressure gave values similar to that following sodium amytal. We have found these simple tests helpful in evaluating and following the progress of individuals with hypertension. Many subjects with normal levels of blood pressure respond to pressor tests with an exaggerated rise to real hypertensive levels. The studies of Hines and others suggest that such exaggerated rises above the initial control levels indicate a constitutional predisposition to hypertension.

Heart Sounds

RARELY can we come to any definite diagnostic conclusions from the quality or intensity of the heart sounds for there is a considerable range of normal variation. There are a few points, however, which may be worthy of note. It is wisest to begin auscultation of the heart at the base, for timing of systolic and diastolic phases is easier at the base than it is at the apex. If one proceeds with the stethoscope from the base toward the apex confusion between systolic and diastolic sounds and murmurs is less apt to result. Accentuation of the second sound over the aortic area or pulmonary area occurs in hypertension and in hypertension of the pulmonary circuit as in mitral stenosis, respectively, but this is of little diagnostic value. Accentuation of the first sound at the apex however frequently provides the first clue to the presence of mitral stenosis. If the first sound at the apex is accentuated careful search for the pre-systolic murmur of mitral stenosis should be carried out with the patient in the left lateral recumbent position, the stethoscope carefully exploring widely over the apical area. Distant sounds at the apex occur not only in normal individuals with a thick chest wall but also in various pathological conditions. Among these we may list the following: cardiac failure, acute coronary occlusion, first stage heart block with prolongation of the P-R intervals, and pericardial effusion. Generally speaking, weakness of the first heart sound is due to a loss of the high-frequency element in the heart sounds. Splitting of the heart sound or reduplication may occasionally provide a clue to the presence of bundle branch block. In such circumstances the splitting of the heart sound is a reflection of the asynchronism in the contraction of the two ventricles. However, much more frequently splitting of the heart sound, particularly a reduplicated second sound occurs in normal individuals. Perhaps the most important abnormality of the heart sound is the presence of an extra sound causing tripling of the heart sound or a gallop rhythm. An extra heart sound in diastole either in the early diastolic phase or in the pre-systolic phase, that is, diastolic gallop, is a definite abnormality and is a sign of serious cardiac weakness. It is of much graver import in an adult than it is in a child, and is also of more consequence when the heart rate is relatively slow than when it is rapid. In

the presence of tachycardia or a rapid circulation such as may occur normally in children an extra sound in diastole may occasionally be heard normally and is therefore less meaningful than in older subjects in cardiac failure. The gallop sound is a very low pitched sound, best heard with a Bell stethoscope near the apex and is easily missed. Extra sounds during systole, i.e., the mid-systolic click, are, generally speaking, of no consequence. From this brief discussion of the various abnormalities in heart sounds such as accentuated sounds, distant sounds, split sounds and extra sounds, it is evident that all of these may occur in normal individuals as well as in those with various types of heart disease so that in a real sense abnormalities of the heart sounds are borderline findings which are not definitely diagnostic of themselves, but which should lead to careful investigation for more definite signs of organic heart disease.

Murmurs

HEART murmurs have been the subject of so much attention that it appears unnecessary to dwell on them at length here. In a word, diastolic murmurs are always organic; systolic murmurs may be functional or organic and are, therefore, in the borderline category. A word about diastolic murmurs, however, may not be amiss for these provided one of our most knotty problems in the examination of insurance applicants. It was our experience that apical diastolic murmurs, i.e., the murmur of mitral stenosis, was frequently missed because this murmur is frequently sharply localized and must be listened for in recumbency. The diastolic murmur of aortic insufficiency at the base of the heart is probably the most frequently missed of all murmurs. This is due to the fact that in the early stages it is very soft, frequently short, and high-pitched murmur. It is difficult to elicit this murmur in a noisy environment and one must listen for it with a diaphragm type of stethoscope with the patient leaning somewhat forward with the respiration suspended in expiration.

Despite a great deal of study no certain means have been found to distinguish an organic from a functional systolic murmur. At the apex perhaps the best criterion is the loudness of the murmur. Murmurs of moderate intensity or more which do not vary significantly with respiration and which persist in recumbency are probably organic. When the murmur is of long duration and tends to replace the first heart sound, it is also much more likely to be an organic murmur. Systolic murmurs over the aortic area mean less in youth than they do in older individuals. In older subjects a systolic murmur over the aortic area is a common accompaniment of dilatation of the aorta due to hypertension, arteriosclerosis or lues. The murmur of aortic stenosis, of course, is loud and rough and frequently accompanied by a thrill. Systolic murmurs over the pulmonary area are more frequently functional than they are organic. A pulmonic systolic murmur, however, deserves further investigation for not infrequently this is the only sign of patent interatrial septum, a fairly common type of congenital anomaly which is compatible with long life. The roentgenologic findings of a markedly dilated pulmonary artery and arterial tree in this condition is very diagnostic.

The question is frequently raised as to whether heart sound recording instruments are of any value in eliciting or interpreting abnormal cardiac sounds or murmurs. Our experience is, quite categorically—No. The only practical application of the heart sound recording instruments now available is in detecting the diastolic gallop sounds which are of low pitch and are not easily audible to the ear. The limited sphere of usefulness of heart sound recording instruments scarcely justifies their general clinical employment.

Heart Size

AN ENLARGED heart is an abnormal heart and so is an important sign that organic disease exists. It should be stated, however, that rarely is the heart significantly enlarged in the absence of other clinical signs of organic heart disease such as hypertension or cardiac murmurs or various other abnormal findings. We would like to point out some pitfalls in the diagnosis of enlargement of the heart for it has been our experience that many individuals are stigmatized as having an enlarged heart and therefore organic heart disease, which is not actually the case. We have no wish to deprecate the ancient and honored techniques of palpation and percussion but one must state that physical examination is quite useless in detecting early enlargement of the heart. The simplest and most thoroughly tried and most satisfactory method for determining whether the heart is enlarged is the six-foot teleoroentgenogram. At six-foot distance with the subject properly centered projection distortion is minimized to the order of 5%. As we have already mentioned, there are many pitfalls which should be recognized before a decision is made as to whether the heart is enlarged. The exposure should be made in the erect or sitting position with respiration suspended in ordinary inspiration, since extremes of breathing or straining may cause marked variations in the size of the heart. Several anatomical peculiarities may cause confusion in interpreting cardiac shadow. The most important is an extra pericardial fat pad which merges with the lower left heart border and which obscures the apex. The margin of the fat pad must not be mistaken for the left heart border which may be discerned within the fat pad particularly if the roentgenogram is made with slightly overpenetrated technique. Cardiac enlargement is frequently erroneously diagnosed owing to the presence of a rather large fat pad which makes the cardiac shadow appear somewhat large. Skeletal abnormalities of the thorax such as funnel chest and kyphoscoliosis by displacing and distorting the heart occasionally may render difficult the accurate determination of the size of the heart. The dextro-scoliotic spine may simulate the right heart border or arch of the

aorta and a diagnosis of cardiac enlargement or dilatation of the aorta may thereby be made erroneously. The size, shape, and particularly position of the heart may be altered in pulmonary diseases and by diaphragmatic hernia or elevation of the diaphragm as in pregnancy and ascites. The problem of the borderline in connection with heart size is not the significance of an enlarged heart, but rather it is deciding whether a heart is or is not enlarged for, as we have already mentioned, an enlarged heart is a diseased heart.

Measurement of the heart size is unnecessary when gross enlargement is evident and is likewise unnecessary when the heart is obviously of normal size. However, lesser degrees of enlargement often escape detction on inspection and conversely an apparently large cardiac shadow may assume less significance when it is considered in relation to standards of body build. If proper account is taken of the physiological variables which influence the size of the heart, mensuration is a valuable aid in determining whether the heart is enlarged. In the considerable number of cases where a positive decision cannot be made on gross inspection, standards of measurement offer real help. The simplest, the most widely employed, and one of the most useful measurements is the transverse diameter of the heart. Some years ago we established standards for the transverse diameter of the heart in relation to weight and height based on a study of 1460 normal subjects. The utility of our tables has been confirmed by Comeau and White, by Sherman and Ducey, and by several other investigators. Transverse diameters of the heart which are more than 10% above the predicted value should be regarded as abnormal and the heart may be considered as almost certainly enlarged if the transverse diameter is over 15% in excess of the predicted diameter according to weight and height, since less than 3% of normal exceeds this limit.

Another thoroughly tried and simple measurement of the heart size which time does not permit to be discussed in detail is the area of the frontal cardiac silhouette which may be calculated quite accurately from the product of the long and broad diameters. We have set up standards for the area of the frontal silhouette and also the transverse diameter of the heart in the form of a nomograph which makes possible the simple application of these two tried and valuable measurements. With the use of either or both the transverse diameter and nomographic determination of frontal cardiac area we have two simple and accurate methods which suffice to determine whether cardiac enlargement is present. I do not wish to give the impression that measurement of the size of the cardiac shadow is or should be the beginning or end of roentgenologic study of the heart. Measurements are of greater value as an index of generalized enlargement of the heart than in determining the size of the individual chamber. As far as is possible in studying the size of the heart an attempt should be made to describe enlargement in terms of the individual chambers, for characteristic changes occur in various types of heart disease. For this purpose, fluoroscopy is of particular advantage because the contours of the separate chambers may be inspected in their entirety by rotating the subject into oblique position and by the use of simple aids such as outlining the esophagus with barium to detect early left auricular enlargement.

The chamber of the heart on which strain is most commonly placed and which is most often enlarged is the left ventricle. Hypertrophy of such is a matter of increase in thickness of a few millimeters. This cannot be detected by any roentgenologic means however sensitive. It is not generally appreciated that the electrocardiogram provides the most sensitive method for detecting hypertrophy of the left ventricle. A few years ago we established specific criteria in the electrocardiogram for the diagnosis of left ventricular hypertrophy. These may be summarized as follows:

1. An increase in amplitude of the QRS complex thus expressed by the sum of R 1 and S 3. Hypertrophy is present if this sum exceeds 2.5 millivolts and is probably present if it is over 2.2 millivolts. Hypertrophy may also be considered to be present if the height of the R 1 alone is 16 mm. or over. This increase in voltage of the QRS complex is the earliest electrocardiographic change in hypertrophy.

2. Any perceptible depression of the ST segment in Lead 1 even of a slight degree as 0.5 mm.

3. Lowering of the T wave in Lead 1 below 1 mm. or further degree of abnormality of the T 1.

These electrocardiographic criteria of left ventricular hypertrophy are of considerable prognostic importance. In a recent mortality study in hypertension we found that there was a distinct increase in mortality with progression in the electrocardiogram toward an abnormal pattern. The life expectancy among those with the pattern of left ventricular hypertrophy according to our criteria was about half that of subjects with identical blood pressure readings with whom the electrocardiograms were normal.

The detection of left auricular enlargement is of great value in interpreting the significance of the apical systolic murmur for in organic mitral insufficiency some degree of enlargement of the left auricle is almost invariably present. An attempt to demonstrate left auricular enlargement should be carried out regularly in the presence of an apical systolic murmur. For the detection of early enlargement of the left auricle roentgenologic study is much more valuable than the electrocardiogram. Early enlargement of the left auricle cannot be detected in the conventional posterior-anterior teleoroentgenogram. The left atrium enlarges posteriorly into the retrocardiac space. The early detection of this change is greatly facilitated by outlining the esophagus with barium. The esophagus pursues a vertical course in the posterior mediastinum directly behind and in apposition with the posterior sur-

face of the heart, i.e., the left atrium. As the left atrium enlarges the barium-filled esophagus is indented and displaced posteriorly in the retrocardiac space. Minimal left atrial enlargement is thus detected by administering a thick barium paste which adheres to the esophageal mucosa outlining it for some length of time after swallowing. It is inadvisable to expose roentgenograms during swallowing of a thin barium mixture such as is used in gastrointestinal study, for the barium bolus can indent the left atrium during deglutition so that lesser degrees of retrodisplacement of the esophagus will escape observation. This is a not uncommon error. Posterior displacement of the esophagus is the earliest and most certain sign of enlargement of the left atrium and usually antecedes other changes such as obliteration of the intrabronchial space and elevation of the left main bronchus or straightening of the upper left heart border. If one waits for the so-called characteristic mitral configuration one will regularly miss the early diagnosis of mitral valvular disease.

Detection of early right ventricular enlargement is one of the real stumbling blocks in cardiac diagnosis. Characteristic changes occur both in the roentgenogram and in the electrocardiogram, but these are late and in fact may be simulated by positional changes in the heart.

Coronary Artery Disease

WE CAN dismiss physical examination and x-ray study in the early diagnosis of coronary artery disease with the simple remark that these procedures are of little or no value. The diagnosis of coronary artery disease is basically an electrocardiographic problem. A serious responsibility is placed on the physician who is confronted with a patient complaining of chest pains, and advice must not be given lightly which so often profoundly affects the patient's outlook and his entire future. Careful study is essential to properly interpret the significance of pain in the chest. It should be emphasized that more than half of subjects with organic angina pectoris exhibit a normal electrocardiogram at rest. While the coronary circulation may be adequate at rest in subjects with coronary disease it is inadequate when the work of the heart is increased and under these circumstances transitory electrocardiographic changes in the form of depressions of the ST segment and T wave changes very often appear which establish a diagnosis of coronary insufficiency. In subjects complaining of chest pain when the resting electrocardiogram is normal, examination is incomplete unless an attempt is made to induce coronary insufficiency. Various forms of stress have been employed such as inhalation of low concentration of oxygen, epinephrin and pitressin, and exercise. The simplest, safest, and most physiologic of these procedures is exercise. A quantitative two-step test has been recommended by Master, but if the steps are not available it suffices quite well to have the patient mount a kitchen stool 20 to 30 times in one and a half to two minutes depending on his agility and tolerance to effort. Factors other than the quantitative amount of work done are important, as we know clinically from circumstances causing angina pectoris. Thus if the patient is exercised after a heavy meal or in a cold room or if he is apprehensive the number of positive responses is greatly increased. If pain develops during the performance, naturally the exercise should be stopped promptly. Electrocardiographic changes usually develop before any pain occurs. Tracings should be taken at brief intervals following exercise. Usually such changes as develop are transitory and disappear within 10 minutes. It should be emphasized that changes may not be maximal or may not even be evident in the first minute after exercise, but are often greatest three to five minutes after completing exercise. Some caution is necessary in interpreting the result, which can be gained only by experience. If there is any considerable tachycardia, it becomes difficult to evaluate the ST segment since the isoelectric line from the end of one beat to the beginning of the next beat disappears. Changes in Lead 1 and in the precordial leads are the most significant. Properly performed and interpreted, the test is of great value. The newer direct writing instruments are of great advantage since one can see the tracing as it is recorded. There are a number of electrocardiographic changes which more or less definitely indicate organic myocardial disease or the occurrence of a previous myocardial infarct. In our discussion of borderline aspects of heart disease, we are not concerned here with such abnormalities. There are, however, a number of electrocardiographic variations which belong in the category of the borderline and which confront all cardiologists almost daily. It is not possible to enter into a discussion of each of these abnormalities individually. Among them we may include the following: prolongation of the P-R interval of lesser degree, that is, first stage heart block, the Q wave in Lead 3, low voltage of the QRS complex, minor degrees of notching and slurring of the QRS complex or unusual electrical axis deviation, moderately low amplitude of the T wave in Lead 1 or even further degrees of abnormality of the T wave such as inversion in Lead 2 and Lead 3. These are only a few of the important variants which occur in the electrocardiogram. So much more harm is done frequently by informing the patient that he has coronary artery disease than is done by overlooking this condition that it appears wisest to pay relatively little attention to such borderline changes, particularly if there are no other corroborative evidences of heart disease. Interpretation of ST segmental and T wave changes particularly requires caution, for the ST segment and T wave are influenced not only by ischemia but by almost endless other metabolic factors as well, such as serum electrolytes, acid-base balance, hormones and hormone deficiencies, toxins and drugs, position of the heart, to mention only a few. A practical illustration of a common error in this connection is seen in electrocardiograms

taken postoperatively. Striking temporary T wave changes may develop normally during the first week or so following any type of major surgery, probably due to changes in serum potassium and acid-base balance, and we have seen many instances where the diagnosis of coronary occlusion has been made erroneously postoperatively.

Patients frequently present themselves for examination with the symptoms of palpitation and the finding of a cardiac arrhythmia. Without entering into a discussion of the subject of arrhythmias as a whole, some remarks on the subject of extrasystoles appear pertinent for this is by far the commonest of all irregularities of the heart beat. Some years ago we carried out an analysis of 1142 cases with extrasystoles in order to determine their clinical significance. This comprised a group of life insurance applicants. In 58% no objective evidence of heart disease was found.

Of themselves, therefore, ventricular extrasystoles are of little significance. Several factors increase the significance of premature beat. Among these are:

1. The occurrence of premature beat of multifocal origin as revealed in the electrocardiogram.
2. Frequent and persistent premature beats, particularly if they occur successively in short runs interrupting the regular rhythm.
3. A definite increase in the number or a shower of extrasystoles immediately following exercise.
4. Occurrence of premature contraction in the presence of rapid heart rate exceeding 90.
5. Inversion of the T wave in the regular beat which follows the extrasystoles as shown in the electrocardiogram.
6. Post-extrasystolic pulsus alternans. This is difficult to detect unless pulse tracings are recorded.

Palpitation is a common symptom often associated with extrasystoles and may occur under numerous other circumstances as well. It has generally been attributed to an increased forcefulness of the regular beat following the premature systole but we have presented evidence that this explanation is not tenable. We have indicated that palpitation occurring with premature contractions or tachycardia is due to, or at least is associated with, an increase in intensity of the first heart sound resulting from a more forcible closure of the atrioventricular valve. The symptom of palpitation is of no particular significance and occurs in normal subjects even more frequently than in those with organic heart disease.

I would like to digress now from the subject of electrocardiography to consider briefly the question of blood cholesterol which has been receiving so much attention in connection with coronary artery disease. Material available in the Diagnostic Laboratory of the Equitable Life Assurance Society provided us with an unusual opportunity to investigate the relationship between blood cholesterol levels and the incidence of arteriosclerosis. Among a group of 612 insurance applicants it was found that the incidence of arteriosclerosis of the aorta was approximately the same in individuals with slight degrees of hypercholesterolemia with an average blood cholesterol of 300 mg. percent as in those with normal cholesterol levels, cholesterol averaging 211 mg. percent.

In contrast, among subjects with low cholesterol levels averaging 160 mg. percent significantly less arteriosclerosis was found; approximately one-third that found in the group with normal levels and high levels of blood cholesterol. In not a single individual in the low blood cholesterol group totalling 77 cases was any calcification of the aorta or major electrocardiographic abnormality indicating definite coronary artery disease found, whereas both these findings occurred in a significant number of individuals in the group with average normal values of cholesterol and high levels of cholesterol. These observations suggest that the so-called normal cholesterol is in reality a high cholesterol and that the cholesterol level of the average American population is of such an order as to predispose to the development of arteriosclerosis. Unfortunately at the present state of our knowledge discussion of blood cholesterol remains largely academic. Although the evidence appears quite convincing that cholesterol plays a significant role in the genesis of arteriosclerosis, unfortunately we have no effective means for lowering blood cholesterol. This is one of the most important problems awaiting solution in the field of heart disease today.

It is evident from this outline that the problem of the borderline in heart disease is almost endless. In fact, borderline changes infinitely outnumber definite signs and symptoms of organic heart disease. Our diagnostic armamentarium in heart disease consists of two-edged weapons which, if not properly employed, often do more harm than good. The techniques we employ in cardiac diagnosis such as the electrocardiograph and x-ray are precision methods but, as already mentioned, it does not necessarily follow that the information they convey is correspondingly precise.

I would like to leave you with a thought that in the management of the patient with heart disease probably the best guide is the old dictum of Sir James McKenzie. Allow the patient to do whatever he can do without developing symptoms. It is a serious mistake unnecessarily to restrict a patient's activities because of the finding of one or more borderline changes such as we have considered here.

A Statistical Study— The U Wave in the Electrocardiogram

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ALTHOUGH a number of investigators have given attention to the U wave, there is little factual evidence to indicate its clinical significance. Since records of annual physical examinations at the Experimental Station of E. I. du Pont de Nemours & Company, including electrocardiographic and corresponding clinical data for approximately 600 persons were readily available, a correlation analysis of the U waves was undertaken from these data.

It was believed that this amount of data would be sufficient to establish a relationship, if any, between the U wave and the clinical data available. Accordingly, it was decided to examine the relationships from a statistical point of view. Statistical studies of this type can be made most advantageously by putting the data on to IBM cards, then processing them through the use of a sorter and an electronic calculating machine.

The major intent of this study was to try to correlate some major characteristics of the U wave with other characteristics of the individual studied, as well as the electrocardiogram. The statistical study is referred to as a "partial correlation analysis." With this as an initial investigation, it is hoped that the full significance and interpretation will be determined in later studies.

Literature Review

ALTHOUGH the U wave is variously reported as occurring in 50% to 90% of instances in the standard leads, little is known about its clinical significance. According to Katz[1] "little attention need be paid to the U wave other than: (1) to describe its normal appearance, (2) to recognize the varieties encountered abnormally, and (3) to consider how it may distort the T wave, the P wave or the isoelectric level." It is said to be most prominent in bradycardia,[2] and it is well known that in rapid rates the U wave may be lost in the T or P waves.[3] It likewise varies somewhat with the respiratory phase.[3] What constitutes normality in the AV and V leads has not been as well studied, nor has the relationship of the U wave in the limb, AV, or V leads, or of the amplitude and duration of it.

Graybiel *et al*[4] studied the electrocardiograms of 1,000 healthy aviators and noted only two instances of an inverted U wave in the three standard limb leads. They felt this result gave support to the generally accepted opinion that inversion is abnormal. In a study of 360 patients over the age of 70, Gavey[5] observed that the U wave was present in the electrocardiogram in 15% of cases in the standard limb leads, mostly in Lead III. Hinden[6] states that the U wave is found in approximately 2.5% of a large series of patients; also, that a large pulse pressure seems to favor the appearance of the wave.

It is stated in Lepeschkin's[2] text that a negative U wave is never present in normals in Leads I, II, or C4, and that it is present in only 0.2% of instances in Lead III, that it appears in 10% to 18% of cases of hypertension in contrast to instances of mitral stenosis, in which it is noted in only 0% to 2% of Leads C1-2, and that in myocardial infarction a negative U wave appeared in 13% of tracings, usually in those leads with a negative T wave. It has been stated by Palmer[7] that "U wave inversion without other electrocardiographic change is seen in patients with hypertension more often than in all other conditions combined. Coronary sclerosis yields the second highest incidence." The same author adds that "isolated U wave negativity is found in about 1% of routine electrocardiograms from general hospital practice. Its association with certain diseases, most of which have well-recognized cardiac manifestations, leads to the conclusion on empirical grounds that it is probably always pathologic." Zuckermann *et al*[8] report that "in precordial leads inversion of the U wave is observed during the ischemic phase of anterior infarcts and positivity is observed during the same phase in posterior infarcts." Gavey[5] further reports that U_{IV} or CRA was present in 36 cases in which the limb leads did not reveal it, and of these, seven were negative. All of the seven patients with the negative U waves showed gross disease such as recent coronary infarction, heart block, and great left ventricular hypertrophy, but a negative U wave was never the sole abnormality in the electrocardiogram. Groedel and Miller[3] studied the U wave in the chest leads of approximately 5,000 patients, and compared the results from healthy individuals and those with abnormal electrocardiograms.

More recently increased attention has been di-

rected to the occurrence of the U wave because it is known to appear in hypopotassemia.[9] Lepeschkin and Surawicz[10] feel that in some cases of hypopotassemia when the Q-T interval was said to be prolonged that the Q-T U interval was measured instead of the Q-T interval. Further, that the elevation of the U wave is a more specific sign of hypopotassemia than changes of the T wave.

The cause of the U wave is not definitely known. Burch and Windsor[11] write that it is an "after potential" wave, it is usually low in amplitude, and that it has no known practical clinical significance. They also believe that large and asymmetrical U waves are sometimes associated with cardiac disease, but the significance of these findings is not understood at present. Others consider that the U wave is caused by distention potentials in the aorta,[2] that it has a ventricular genesis,[2] and that it is probably a manifestation of an electrical stress within the heart and results from position changes of the heart during ventricular relaxation.[1]

The duration of the U wave and its amplitude is variable. Graybiel, *et al*[4] report that in a study of Lead IVR, the U wave varied in amplitude from 0.1 to 1 mm., with a mean of 0.28 mm. The normal U wave is said to vary in height from 0.25 to 2.0 mm., and in duration from 0.18 to 0.24 seconds.[12] Nahum and Hoff[13] write of the normal U wave in normal subjects as a low summit never more than 1.5 mm. high, but more often from 0.25 to 0.75 mm., and its average duration as 0.2 second. Groedel and Miller[3] report the U wave in chest leads from healthy individuals rarely to have an amplitude of more than 0.1 mv., and the mean duration to be 0.16 to 0.2 second.

There is some variation of opinion as to what constitutes abnormality of the U wave. The U wave has been considered abnormal when inverted, diphasic, or upright and taller than 2 mm. Palmer[7] concludes on empirical grounds that an isolated negative U wave is probably always pathologic. Nahum and Hoff[13] record that an inverted U wave was present in their study only when heart disease was present. Gavey[5] believed that a negative U wave in his study was never the sole abnormality in the electrocardiogram. Nahum and Hoff[13] likewise report from their study that an inverted U wave was found only when heart disease was present. Gavey[5] believes presses the opinion that "a negative U wave may precede classic electrocardiographic findings of such chronic diseases as hypertension and coronary sclerosis sometimes by years, and that it is also reversible. Further, that recognition of isolated U wave negativity as an early pathologic finding will increase the diagnostic value of the electrocardiogram."

Procedure in Making Study

THIS study included a statistical survey of the T and U waves on the electrocardiograms (taken consecutively over a one-year period) of 609 employees at the Du Pont Experimental Station in Wilmington, Delaware. Most of these electrocardiograms were taken on employees 40 years of age or over. It is routine for this group to have an annual electrocardiogram, in addition to other routine studies. Each of the 609 electrocardiograms studied included the three standard limb leads, the AVR, AVL, AVF leads, and V leads II to VI inclusive. In addition, the clinical condition of each employee was known or obtainable.

Also, most of these employees had two or more electrocardiograms for comparison. Any possible drug effect on the electrocardiogram was considered by a knowledge of the patients' employment, their clinical status, and a comparison with previous electrocardiograms.

In this investigation the durations of the T and U waves were studied in each of the several leads. However, for the indicated Study 1 (limb and AV leads), and the related tables, the T and U waves were each classified similarly regardless of which limb or AV lead they were measured. Correspondingly, each of the T and U wave measurements in Study 2 was treated similarly—but respectively, regardless of which V lead they happened to be measured. This was necessitated by the fact that sufficient data were not available to study each lead separately as would be desirable.

A particular limb or AV lead was selected, and the corresponding T and U wave measured for that individual on the basis of that lead having the most clearly defined and pronounced waves. In a similar fashion the most prominent V leads were also selected, and the corresponding T and U waves measured. These data were used as the basis for Tables I, IV, V, VI, VII, VIII, and IX, and Figs. 1 through 7.

As a second measure of classification, the amplitude of the U wave was also studied in the various leads. However, in this case the amplitude was only classified into one of three categories; i.e., (a) less than 0.5 mm.; (b) greater than 0.5 mm. but less than 1 mm.; (c) greater than 1 mm.

On this basis the amplitude of the U wave was then correlated with other physical measurements and observed diseases.

Results

PREPARATORY to the previously mentioned correlation analysis, the clinical data collected were studied for various other facts. Table I is a summary of the statistical averages for the 10 principal measurements made on the individuals studied. They are broken down into the four indicated categories—male and female for both the AV-limb and V leads. Since no significant differences were observed in the U wave (and T wave) occurring in the AV or limb leads, these data were combined for this table.

Duration Study

IT SHOULD be noted that for the aforementioned population of 609 individuals, the U wave duration was measurable in 549 cases using the

AV-limb leads (designated as Study 1), and 593 cases using the V leads (designated as Study 2). All but eight of the former cases are included in this second study. That is, when the U wave appeared and was measurable in the AV and limb leads, it almost always appeared and was measurable in the V leads. This also accounts for the very close agreement in averages for the last eight characteristics indicated in Table I.

The following is a summary of the significant results from the duration study.

1. In Table I, it is interesting to note that while the average duration for the U wave within each of the four categories remained essentially the same, there is a striking difference in the average T wave duration between the AV-limb and V leads.

2. A comparison of the other data of Table I for males and females, showed the following: (a) the weight and height of males, as expected, was greater than for females; (b) the three indicated blood pressures (systolic, diastolic 4th phase, diastolic 5th phase) are on the average about 8% lower for females than for males; (c) pulse rates were the same for both sexes; (d) the Q-T interval is longer for females.

3. The incidence of axis position of the heart is shown in Table II, mid-position occurring in 28.4%, left axis position in 56.2%, and right axis position in 15.4% of the cases studied.

4. The appearance or duration of the U wave does not seem to be related to the axis position of the heart.

5. The amplitude of the T_1 wave exceeded that of the T_2 wave in an unusually great number of instances. This comparison was made by relating the T_1 to the T_3 wave in three degrees only (greater than, equal to, or less than). The observed frequencies of these comparisons are indicated in Table III.

6. The most pronounced T wave in the limb and AV leads occurs in the second limb lead for Study 1, and in the third V lead for Study 2. The frequencies, duration, and standard deviation of the most pronounced T waves (and the corresponding U wave) for each of the two studies are indicated in Table IV.

7. The T wave was predominantly upright in all leads except the V_1 lead, in which case it was observed to be inverted in 64% of the cases. An

TABLE I.
SUMMARY OF AVERAGED STATISTICAL DATA UTILIZED IN STUDY
(Arithmetic Means of Selected Characteristics by Sex and Particular Leads)

		Study 1 For AV-Limb Leads		Study 2 For V Leads	
Characteristic	Units	Male	Female	Male	Female
Number of Cases	Sex	474	75	515	78
T Wave Duration	Seconds	.148	.136	.196	.180
U Wave Duration	Seconds	.121	126	.122	.121
Age	Years	46.7	41.6	46.6	41.5
Weight	Pounds	166.7	133.9	167.0	133.1
Height	Inches	68.7	64.8	68.6	64.8
Systolic Pressure	mm.Hg	128.5	116.1	129.2	115.6
Diastolic Pressure, 4th Phase	mm.Hg	82.5	76.3	82.9	76.1
Diastolic Pressure, 5th Phase	mm.Hg	80.5	74.1	80.9	74.8
Pulse Rate	Beats/Min	78.3	78.8	78.9	78.2
Q-T	Seconds	.327	.335	.327	.334

TABLE II.
SUMMARY OF AXIS POSITION

Position	Frequency	Relative Frequency
Mid-position	173	28.4%
Left Axis Deviation	342	56.2%
Right Axis Deviation	94	15.4%
Total	609	100%

TABLE III.
COMPARISON OF T WAVE AMPLITUDE

Comparison	Frequency
T_1 greater than T_3	445
T_1 approximately equal to T_3	107
T_1 less than T_3	43

TABLE IV.
DURATION COMPARISON OF THE T AND U WAVES

		T Wave			U Wave		
Lead	Position	Frequency	Duration	Standard Deviation	Frequency	Duration	Standard Deviation
Limb	1	136	.149±.005	.027	136	.128±.007	.040
	2	310	.151±.003	.026	310	.123±.004	.030
	3	69	.128±.007	.028	69	.112±.008	.032
AV	AVR	12	.117±.009	.014	12	.105±.021	.033
	AVL	10	.146±.023	.032	10	.079±.024	.034
	AVF	12	.132±.017	.026	12	.123±.018	.028
V	1	2	.150± —	.042	2	.090± —	.014
	2	97	.191±.007	.032	97	.123±.006	.031
	3	347	.199±.004	.038	347	.123±.003	.028
	4	122	.187±.007	.037	122	.118±.005	.027
	5	21	.168±.013	.028	21	.116±.013	.028
	6	4	.128±.025	.025	4	.118±.070	.044

TABLE V.
T WAVE DIRECTION TYPE

	Upright			
Lead	Normal	Flat	Inverted	% Cases of Inversion
Limb 1	594	15	0	0
Limb 2	604	3	2	0.3
Limb 3	402	88	119	19.5
AVR	0	0	609	100
AVL	416	104	89	14.6
AVF	572	24	13	2.1
V1	163	56	390	64.0
V2	592	4	13	2.1
V3	601	1	7	1.2
V4	602	1	6	1.0
V5	601	2	6	1.0
V6	602	3	4	0.7

TABLE VI.
U WAVE DIRECTION TYPE, UPRIGHT OR INVERTED

	Upright		Inverted		
Lead	Size	Tiny	Size	Tiny	Total
Limb 1	252	89	2	0	343
Limb 2	317	125	2	1	445
Limb 3	190	71	70	10	340
AVR	0	0	356	75	431
AVL	173	62	36	7	278
AVF	303	101	9	3	416
V1	84	37	121	24	266
V2	393	146	2	2	543
V3	409	155	4	1	569
V4	395	150	5	2	552
V5	353	126	8	2	489
V6	243	98	5	0	346

inverted T wave was also observed, but less frequently, in the third limb lead and the AVL lead. No upright T wave was observed in the AVR lead. These results are indicated in Table V.

8. The U wave was discernible in every lead in about seven cases out of 10. As indicated by Table VI, all U waves observed were inverted in the AVR lead. Many inverted U waves were also observed in the third limb and in the V_1 lead.

9. Scatter diagrams of the T and corresponding U wave durations are indicated by Figs. 1 to 7. A statistical test of significance indicated that there is a significant correlation between the duration of the T and U waves. That is, when the T wave has a long or short duration, the U wave also tends to be correspondingly long or short.

10. A summary of the partial correlation analysis for the T and U waves is given in Table VII for the males, and a summary for the females is given in Table VIII. These results indicate that the pulse rate has the predominant (of the variables studied) effect on the T or U wave duration; the higher the rate, the shorter the duration.

These results are discussed in detail in the Statistical Section under the appropriate table number.

TABLE VII.
PARTIAL CORRELATION COEFFICIENTS OF T AND U WAVES FOR MALES

Variable	Variable Study	Weight	Height	Systolic Pressure	Diastolic Pressure, 4th Phase	Pulse Rate	Q-T Interval	T Wave	U Wave
Age	Limb, AV	N.S.*	—.13	.24	—.16	.09	.12	—.07	—.08
	V							—.05	—.06
Weight	Limb, AV		.42	N.S.*	.22	N.S.*	N.S.*	—.14	—.04
	V							0	0
Height	Limb, AV			N.S.*	—.12	N.S.*	N.S.*	.05	—.07
	V							—.11	—.10
Systolic Pressure	Limb, AV				.65	.16	N.S.*	.05	—.06
	V							—.06	—.03
Diastolic Pressure, 4th Phase	Limb, AV					N.S.*	N.S.*	—.06	.03
	V							—.02	0
Pulse Rate	Limb, AV							—.26	—.12
	V						—.63	—.15	—.17
Q-T Interval	Limb, AV							0	—.01
	V							.12	.01

Greater (less) than 0.09 (—0.09) is 95% significant.
*N.S. = Not Significant.

TABLE VIII.
PARTIAL CORRELATION COEFFICIENTS OF T AND U WAVES FOR FEMALES

Variable	Variable Study	Weight	Height	Systolic Pressure	Diastolic Pressure, 4th Phase	Pulse Rate	Q-T Interval	T Wave	U Wave
Age	Limb, AV	.31	—.38	N.S.*	N.S.*	—.18	N.S.*	—.23	—.12
	V							—.21	—.19
Weight	Limb, AV		.48	.29	—.14	N.S.*	.19	.08	—.06
	V							.03	—.04
Height	Limb, AV			N.S.*	.19	N.S.*	N.S.*	—.12	—.04
	V							—.06	—.10
Systolic Pressure	Limb, AV				.67	N.S.*	N.S.*	0	0
	V							—.06	—.19
Diastolic Pressure, 4th Phase	Limb, AV					.24	N.S.*	.05	.05
	V							—.03	.04
Pulse Rate	Limb, AV						— .65	—.16	—.16
	V							—.26	—.08
Q-T Interval	Limb, AV							.13	.10
	V							.03	.17

Greater (less) than 0.25 (—0.25) is 95% significant.
*N.S. = Not Significant.

T WAVE DURATION

U Wave Duration	.08-.09	.10-.11	.12-.13	.14-.15	.16-.17	.18-.19	.20-.21	.22-.23	.24-.25	Totals
.04-.05	1				1					2
.06-.07		1	2	3						6
.08-.09		3	6	3	2	1			1	16
.10-.11	1	1	6	5	6	1	2			22
.12-.13			10	11	10	4	1		1	37
.14-.15		1	2	13	7	2	4			29
.16-.17			4	— 3	3	1				11
.18-.19				3	4	2	1			10
.20-.21				1		1				2
.22-.23				1						1
Totals	2	6	30	42	33	12	8		2	136

Limb Lead I

Fig. 1.
A correlation table showing the tendency for longer U Waves to be associated with longer T Waves in LIMB LEAD I.

T WAVE DURATION

U Wave Duration	.08-.09	.10-.11	.12-.13	.14-.15	.16-.17	.18-.19	.20-.21	.22-.23	.24-.25	Totals
.04-.05				1						1
.06-.07	2	1	3	5	3	1				15
.08-.09		5	11	12	8	2				38
.10-.11	1	4	10	17	15	3	5			55
.12-.13		1	22	16	31	11	7			88
.14-.15			6	19	21	7	7		1	61
.16-.17		2	4	11	10	3	3			33
.18-.19			2	3	3	5				14
.20-.21				1	2	2				5
Totals	3	13	59	85	93	34	22		1	310

Limb Lead II

Fig. 2.
A correlation table showing the tendency for longer U Waves to be associated with longer T Waves in LIMB LEAD II.

Amplitude Study

IN THIS particular phase of the analysis, the amplitude of the U wave was correlated with other physical data and any observed diseases that the individuals under study might have had.

For this analysis the U wave amplitude was classified in one of the three previously indicated categories; i.e., (a) less than 0.5 mm.; (b) greater than 0.5 mm. but less than 1 mm.; (c) greater than 1 mm.

For any one individual the largest U wave in any one of the 12 leads was measured and classified. If no U wave appeared in the limb or AV leads but did appear in a V lead, then the amplitude of that particular U wave was measured.

Of the total of 601 individuals for which the amplitude of the U wave was measurable in at least one lead, the frequencies of occurrence within each of the categories under study are as follows:

	Number	Frequency
A.	451	75.1
B.	139	23.1
C.	11	1.8
	601	

T WAVE DURATION

U Wave Duration	.10-.11	.12-.13	.14-.15	.16-.17	.18-.19	.20-.21	.22-.23	.24-.25	.26-.27	.28-.29	.30-.31	Totals
.04-.05					1							1
.06-.07				1								1
.08-.09			2	4	6	2	1	1				16
.10-.11			2	7	4	2						15
.12-.13	1		2	3	6	14	3	3				32
.14-.15			1	3	2	8	2	1				17
.16-.17		1		1	1	1		4		1		9
.18-.19					1	2						3
.20-.21						1		1			1	3
Totals V2 Lead	1	1	7	19	21	30	6	10		1	1	97

Fig. 3.
A correlation table showing the tendency for the longer U Waves to be associated with longer T Waves in V2 LEAD, but not being as apparent as in LIMB LEADS 2 and 3.

T WAVE DURATION

U Wave Duration	.08-.09	.10-.11	.12-.13	.14-.15	.16-.17	.18-.19	.20-.21	.22-.23	.24-.25	.26-.27	.28-.29	.30-.31	Totals
.04-.05					1		1						2
.06-.07					3	2	1		1				7
.08-.09	2	1	2	9	12	6	9	5	4	1	1		52
.10-.11			1	5	11	4	13	5	7	1	4		51
.12-.13				8	21	24	31	14	12	4	6		120
.14-.15				1	7	11	19	8	9	2	4		61
.16-.17		1		2	6	7	9	7	6	1	1	1	41
.18-.19							2	2	1	3	1		9
.20-.21								3					3
.22-.23								1					1
Totals V3 Lead	2	2	3	25	61	54	85	45	40	12	17	1	347

Fig. 4.
A correlation table showing the tendency for longer U Waves to be associated with longer T Waves in V3 LEAD.

T WAVE DURATION

U Wave Duration	.08-.09	.10-.11	.12-.13	.14-.15	.16-.17	.18-.19	.20-.21	.22-.23	.24-.25	.26-.27	.28-.29	Totals
.04-.05	1											1
.06-.07				1	4							5
.08-.09			1	2	3	4	2	1	3			16
.10-.11			2	3	5	1	9		3	1		24
.12-.13			3	1	14	8	10	3	5	1		45
.14-.15				2	4	5	3	4	2	1	1	22
.16-.17					1	1	1	1				4
.18-.19				1			2	1		1		5
Totals V4 Lead	1	0	6	10	31	19	27	10	13	4	1	122

Fig. 5.
A correlation table showing the tendency for the longer U Waves to be associated with longer T Waves in V4 LEAD, but not being as apparent as in LIMB LEADS 2 and 3.

T WAVE DURATION

U Wave Duration	.08-.09	.10-.11	.12-.13	.14-.15	.16-.17	.18-.19	.20-.21	.22-.23	.24-.25	.26-.27	.28-.29	.30-.31	Totals
.04-.05	1		1		1	1	1						5
.06-.07				1	8	2	1		1				13
.08-.09	2	1	5	14	19	17	13	7	8	1	1		88
.10-.11		1	4	10	27	9	27	5	10	2	4		99
.12-.13		1	5	11	41	41	55	20	20	5	6		205
.14-.15				4	14	18	32	14	12	3	5		102
.16-.17		1	1	2	8	9	12	8	10	1	2	1	55
.18-.19			1	1		2	6	3	1	4	1		19
.20-.21							1	3	1			1	6
.22-.23								1					1
Totals Composite Total-V1 to V6 Leads	3	4	17	43	118	99	148	61	63	16	19	2	593

Fig. 6.
A correlation table showing the tendency for longer U Waves to be associated with longer T Waves in the COMPOSITE TOTAL-V1 to V6 LEADS.

Because of the rare instances of the extra high (C) U wave, this study was then reduced to only two classifications: (a) less than 0.5 mm.; (b) greater than 0.5 mm.

As a result of this analysis the following significant conclusions may be drawn:

1. As indicated by Table X the higher U waves for both males and females are associated with (a) lower age, (b) lower weight, (c) higher systolic pressures, (d) lower pulse rates, (e) longer duration U waves. (Because of a lack of a sufficient quantity of data the female study will not be included in any further summaries, except under the disease study.)

2. A two-variable breakdown by age and amplitude in Table XI indicates the tendency for higher amplitude U waves to occur with lower age.

3. Table XII indicates the tendency for higher amplitude U waves to be associated with lower weights.

4. No correlation of amplitude in respect to height is indicated by the data of Table XIII. In addition there did not seem to be any definite—or observable—relationship between amplitude and build (stout, thin, etc.).

T WAVE DURATION

U Wave Duration	.08-.09	.10-.11	.12-.13	.14-.15	.16-.17	.18-.19	.20-.21	.22-.23	.24-.25	Totals
.04-.05	1	1		1	1	1				5
.06-.07	7	3	9	10	3	2				34
.08-.09	4	10	29	19	10	3			1	76
.10-.11	3	6	26	25	22	5	7			94
.12-.13		4	42	30	42	18	8		1	145
.14-.15	1	3	14	33	34	10	12		1	108
.16-.17	1	3	11	18	13	4	4			54
.18-.19			3	6	7	7	2			25
.20-.21				2	2	3				7
.22-.23				1						1
Totals	17	30	134	145	134	53	33	0	3	549

Composite Total-Limb and AV Leads

Fig. 7.
A correlation table showing the tendency for longer U Waves to be associated with longer T Waves in the COMPOSITE TOTAL-LIMB AND AV LEADS.

5. Table XIV relates the U wave amplitude to blood pressure. There appears to be a tendency for hypertensives to have higher amplitude U waves. There appeared to be no significant relationship between hypertension and the duration of the U wave.

6. Table XV indicates that abnormal heart rates (either slow or rapid) might be associated with smaller amplitude U waves. (Table XVI.)

TABLE IX.
COMPARISONS OF PARTIAL CORRELATION COEFFICIENTS

Correlation	Male	Female	Remarks
Age			
-Weight	(—.01)	.31	Probably Different
-Height	—.13	—.38	Probably Same
-Systolic	.24	(.13)	Probably Same
-Diastolic, 4th Phase	—.16	(0)	Probably Same
-Pulse Rate	.09	(—.18)	Probably Different
-Q-T Interval	.12	(.02)	Probably Same
Weight			
-Height	.42	.48	Probably Same
-Systolic	(.02)	.29	Probably Different
-Diastolic, 4th Phase	.22	(—.14)	Probably Different
-Q-T	(.04)	(.19)	Probably Same
Height			
-Diastolic, 4th Phase	—.12	(.19)	Probably Different
Systolic			
-Diastolic, 4th Phase	.65	.67	Probably Same
-Pulse Rate	.16	(.05)	Probably Same
Pulse Rate			
-Q-T Interval	—.63	—.65	Probably Same

( ) Connotates the observed but non-significant correlation.

TABLE X.
SUMMARY OF AVERAGED STATISTICAL DATA RELATED TO U WAVE AMPLITUDE

	Males		Females	
U Wave Amplitude	A	B	A	B
Number	392	129	59	21
Age	47.1	45.0	42.5	38.2
Weight	168.1	163.4	135.6	129.4
Height	68.6	68.5	64.6	65.6
Systolic	128.2	132.1	114.8	119.8
Diastolic, 4th Phase	82.6	83.3	75.3	79.3
Pulse Rate	79.6	76.4	77.9	80.0
Q-T Internal	.325	.332	.335	.330
U Wave Duration Limb-AV	.118	.129	.125	.127
U Wave Duration V Leads	.119	.131	.113	.131

Same units as Table I.

TABLE XI.
U WAVE AMPLITUDE AND AGE (MALES)

Age	Amplitude				
	A		B		
	Number	Percent	Number	Percent	Total
22-42	106	70%	46	30%	152
43-48	149	79%	40	21%	189
48-	137	76%	43	24%	180
	392		129		521

TABLE XII.
U WAVE AMPLITUDE AND WEIGHT (MALES)

Weight	Amplitude				
	A		B		
	Number	Percent	Number	Percent	Total
100-158	137	69%	61	31%	198
159-176	121	77%	37	23%	158
177-276	134	81%	31	19%	165
	392		129		521

TABLE XIII.
U WAVE AMPLITUDE AND HEIGHT (MALES)

Height	Amplitude				
	A		B		
	Number	Percent	Number	Percent	Total
59-66	83	77%	25	23%	108
67-69	156	74%	54	26%	210
70-75	153	75%	50	25%	203
	392		129		521

TABLE XIV.
U WAVE AMPLITUDE AND BLOOD PRESSURE (MALES)

Condition	Amplitude				
	A		B		
	Number	Percent	Number	Percent	Total
Hypotension <100 mmHg.	5	100%	0	—	5
Normal	355	76%	109	24%	464
Hypertension >150 mmHg.	32	61%	20	39%	52
	392		129		421

TABLE XV.
U WAVE AMPLITUDE AND HEART RATE (MALES)

Condition	Amplitude				
	A		B		
	Number	Percent	Number	Percent	Total
Bradycardia (<50 Beats/Min)	2	50%	2	50%	4
Normal	357	74%	121	26%	478
Tachycardia (>100 Beats/Min)	33	84%	6	16%	39
	392		129		521

TABLE XVI.
U WAVE AMPLITUDE AND PULSE RATE (MALES)

Pulse Rate (Beats/Min)	Amplitude				
	A		B		
	Number	Percent	Number	Percent	Total
40-72	127	71%	52	29%	179
73-84	139	77%	42	23%	181
85-130	126	78%	35	22%	161
	392		129		521

TABLE XVII.
U WAVE AMPLITUDE AND Q-T INTERVAL (MALES)

Q-T (Seconds)	Amplitude				
	A		B		
	Number	Percent	Number	Percent	Total
.28-.32	68	82%	15	18%	83
.32	188	76%	59	24%	247
.33-.34	136	71%	55	29%	191
	392 (75.2%)		129 (24.8%)		521

TABLE XVIII.
U WAVE AMPLITUDE AND DURATION IN V LEADS (MALES)

Duration (Seconds)	Amplitude				
	A		B		
	Number	Percent	Number	Percent	Total
.04-.10	119	78%	34	22%	153
.11-.13	168	78%	47	22%	215
.13-.22	99	67%	48	33%	147
	386		129		515

6 with no U Wave in V Leads

7. The U wave amplitude is higher as the Q-T interval becomes longer. (See Table XVII.)

8. No correlation between the U wave amplitude and axis position of the heart was indicated.

9. The very long duration U waves seem to be associated with the higher amplitude U waves. (See Table XVIII.)

10. The frequencies of occurrence of the types A and B amplitudes, corresponding to observed diseases of the individuals studied was also tabulated. An unusually high preponderance of large amplitude U waves particularly occurred in cases where rheumatic heart disease was also observed. This has been noted previously by others. Hypertension, also as reported by others, appears to increase the U wave amplitude. Rheumatic heart disease, hypertension, and premature ventricular contractions all appear to be associated with higher amplitude U waves. Further study may elucidate the reason for this. These data are indicated in Tables XIX and XX for males and females respectively.

Discussion of Statistical Procedures

A DISCUSSION of the statistical procedures and techniques utilized in this study is indicated below under the appropriate table or figure number. In each of these cases a simplified discussion for each statistical concept involved is included.

Figs. 1-7: To determine whether any significant relationship might exist between the duration of the T wave and the U wave, a so-called scatter diagram was prepared for each group of leads. Since the T wave and U wave duration were each measured on the same individual for the same electrocardiogram lead, this should result in a relatively pure comparison.

In preparing the scatter diagram, a rectangular array of squares is laid out with each square having two numbers associated with it which correspond to values for the two quantities being compared. The scatter diagram for limb Lead I is indicated by Fig. 1. For example, for every individual having a T wave duration between .12 and .13, and a U wave duration between .08 and

TABLE XIX.
U WAVE AMPLITUDE AND DISEASES—MALES

	One Disease		Two Diseases	
Disease	A	B	A	B
None	308 (78.6%)	84 (21.4%)		
Hypertension	32 (61.5%)	20 (38.5%)		1
Hypotension	5	0		
Angina	1	1		
Diabetes	1	1		
Right Heart Strain	2			
Low Voltage	5		2	
Pyelonephritis	1			
Rheumatic Heart Disease	6	11		2
Ventricular Premature Beats	5	4	3	2
Sinus Tachycardia	13	2	11	1
Neurasthenia	3		1	
Coronary Heart Disease	2	2		1
Anterior Infarction	1			
Posterior Infarction	1			1
Calcified Aortic Stenosis	1			
Heart Block	1			
Sinus Arrhythmia	1			
Nodal Tachycardia	1			
T.B.	1			
Anemia (Secondary)	1			
Short QT			1	
Left Bundle Branch Block			2	
Auricular Premature Beats		1		1
Right Bundle Branch Block		1		
Left Heart Strain		1		
Long QT		1		
Sinus Bradycardia			1	
	392	129		

TABLE XX.
U WAVE AMPLITUDE AND DISEASES (FEMALES)

	Amplitude	
Disease	A	B
None	33	19
Hypertension	5	2
Hypotension	11	2
Angina		1
Arteriosclerosis	1	
Low Voltage		1
Rheumatic Heart Disease	5	4
Sinus Tachycardia	1	1
Coronary Heart Disease	2	
Sinus Arrhythmia	1	
	59	21

.09, a count of 1 is tallied in box [(.12-.13), (.08-.09)]. As can be seen from Fig. 1, six such individuals were counted. In this particular case, a count was tabulated for each of the 136 individuals measured.

A summary of these data is included in Figs. 1 to 7.

In addition to the individual scatter plots for the five leads, a composite scatter plot has been included for both the limb and AV leads (Fig. 6), and the six V leads (Fig. 7). The subtotals for both the T and U wave columns and rows are distributed quite reasonably well for the limb and AV leads. That is, there is a certain symmetry to the data for both the T and U wave durations, wherein the subtotals progressively decrease from the largest values of 145 and 145, respectively. However, this symmetry is not quite as apparent for the T wave subtotals for the VI-6 leads (Fig. 7). This seeming inconsistency is also borne out in the individual scatter plots of the V2, V3, and V4 (Figs. 3 to 5) leads. At present, no statistical interpretation for this apparent discrepancy is known.

A statistical test of "significance" was applied to these data to determine whether there is a significant correlation between the T and U wave durations. That is, is there a tendency, say, for long duration U waves to occur at the same time that long duration T waves occur? The result of this statistical test indicates that there is a "significant" trend for the U waves to have a longer duration when the corresponding T wave is of a longer than average duration.

Table IV: In Table IV the average durations of the T and U leads are indicated as A ± B, where A connotes the actually observed duration, and B indicates the degree of reliability in that average. For example, 136 T waves in the first limb lead were measured and found to have an average of .149 seconds duration. If an infinite number of electrocardiograms were similarly measured, we would be 95% sure that their average duration would be between .149 ± .005 or .144 to .154 seconds in the first limb lead. In essence, this measure of confidence of the average takes into account the number of observations made and the relative variation (standard deviation) between the individual measurements. Obviously, one would not have as much confidence in an average based on five measurements as one would have if the average had been based on an infinite number. These confidence factors have been put into this quantitative form as denoted in the table.

Also included in Table IV are the values of the so-called *standard deviation* which were calculated from the individual values for each of the particular groupings. This value is the square root of the average squared deviation between the individual measurements and their mean value.

For example, for the numbers 7, 8, 9, and 10 the average or mean value is, of course, equal to 8.5. The standard deviation (S.D.) can then be calculated as follows:

$$\text{S.D.} = \sqrt{\frac{(7-8.5)^2 + (8-8.5)^2 + (9-8.5)^2 + (10-8.5)^2}{4\ (\text{Number of Terms})}}$$

$$= 1.12.$$

In practice, for certain mathematical reasons, the numerator should be divided by the number of observations minus one.

The standard deviation can thus be interpreted as a measure of the variation between the individual observations. If its value is small in relation to the average, then this can be taken to imply that all of the individual values are essentially the same. Conversely, a large value implies that they differ quite appreciably among themselves.

It is surprising to note in this regard that in the limb and AV leads there is a significant tendency for the U wave durations to have more variation among themselves than the T wave durations; but the converse is true in the V leads. For this reason a further comparison was made by calculating the weighted average for the average duration, and its standard deviation for each of the four major categories. These data are summarized as follows:

	T Wave		U Wave	
Leads	Duration	S.D.	Duration	S.D.
Limb and AV	14.64	2.64	12.17	3.31
V	19.35	3.65	12.16	2.84

In terms of a percentage variation, it is $\frac{2.64 \times 100}{14.64} = 18\%$ for T wave in the limb and AV leads, and $\frac{3.65 \times 100}{19.35} = 19\%$ for the V leads. Similarly $\frac{3.31 \times 100}{12.17} = 27\%$ for the U wave in the limb and AV leads and $\frac{2.84 \times 100}{12.16} = 23\%$ in the V leads. On this basis it may be concluded that there is a significant tendency for the duration of the U waves to vary more percentagewise between individuals than the duration of their T waves with all due consideration for the error in measuring these intervals. For this reason, when more is known about the characteristics of the U wave, such as its duration, amplitude, and possibly area, it might ultimately indicate more information concerning the health of an individual than the T wave duration.

Tables VII, VIII, IX: As a simple example of a "partial correlation analysis," suppose that three measurements were made on a large number of individuals: these measurements might be blood pressure, height, and weight. If it were desirable to determine whether any significant correlation might exist between these characteristics, the specific degree of correlation between these factors could be evaluated by means of a partial correlation analysis. This would then tell whether high blood pressure, for any one individual, is usually associated with that person's overweight or height, for example. This method of analysis could not indicate that overweight

causes high blood pressure or *vice versa*, but simply that overweight people usually have high blood pressure or *vice versa*.

The actual degree of correlation is determined in terms of a so-called partial correlation coefficient whose range of values is between minus one and plus one. The term, partial correlation, means the correlation which exists between the factors specified—independent of any other factors.

A correlation of plus one or minus one means that there is an exact relationship between the factors, the former (+1) implying high values (weight) associated with high values (height), and the latter (−1), high values with low values. When specific partial correlation coefficients have been determined, statistical tables can then be used to determine whether these relationships have "significance," or are due to chance. Obviously, one would have a perfect (+1) correlation coefficient in the case of just two individuals, say, with height 68 inches, weight 250 pounds for one, and 72 inches, 150 pounds in the other case. However, this coefficient would not be *statistically significant*.

Because of the unusual nature of this study, and the previous lack of knowledge as to the expected correlations, it was felt necessary that these data should be broken down into eight groups or separate studies. These included the following:

Case Study Number	Major Variables
1	Males—Correlation with T wave in limb and AV leads
2	" " " U " " limb and AV leads
3	" " " T " " V leads
4	" " " U " " V leads
5	Females " " T " " limb and AV leads
6	" " " U " " limb and AV leads
7	" " " T " " V leads
8	" " " U " " V leads

Within each one of these studies the inner correlations of seven variables and their relation to the specified T or U wave were evaluated. These variables are: age; weight; height; systolic pressure; diastolic pressure 4th phase; pulse rate; Q-T interval.

Originally, it was the purpose of this study to include the 5th phase diastolic pressure; however, there is a 98% correlation between the 4th and 5th phases of diastolic pressures, and since such high correlation would interfere with the over-all partial correlation analysis, only the 4th phase diastolic was included.

The over-all evaluation of the correlation of the seven variables in relation to the T and U wave indicates that one or more of the above variables influences (or is influenced by) the duration of the T wave relatively strongly in respect to the U wave duration. That is to say, the duration of the T and U waves, as measured on the electrocardiogram, is influenced by (or influences) at least one of the indicated variables. This is particularly evident in the case of the males, as more information was available with the larger sample (roughly 500 cases opposed to 70).

A summary of these results is indicated in Tables VII and VIII. Only those inner correlations (among the seven major variables) which are significant, or at least on the borderline of significance, are included. On the other hand, all of the partial correlation coefficients in respect to the T or U wave are included for all cases.

Within each of the two tables, the inner correlations among the seven variables for the four indicated cases (limb-T, limb-U, and V-U) have been combined, and only their averages are indicated. For mathematical reasons these values should be the same except for round-off computational errors, and the fact that not all individuals in the V lead study are included in the limb-AV study. In all, each set of the four values was in good agreement.

In terms of these inner correlations, it is interesting to note that in the case of the females there is a strong tendency for them to increase in weight with age. Conversely, there is no indicated trend in the male case. This cannot, of course, be assumed as a generality (it is not the case in general), since this only relates to employees at the Experimental Station who are for the most part over the age of 40. This restriction also holds in respect to all of the conclusions drawn from this study.

As indicated below each table, in order to be statistically significant the correlation factors have to exceed (in absolute value) the values .09 for the male, and .25 for the female studies. As previously mentioned, the larger value for the female case is due to the fact that less data are available and, therefore, there is more chance for a large spurious value to occur by chance. However, if a correlation really exists, then regardless of the sample size, these correlation factors will tend to be the same except for chance deviations. This is particularly illustrated in the case of the correlation between the systolic and diastolic pressures. In both cases, the correlation is roughly .65—a very high correlation. Similarly, a high correlation exists in the cases of weight-height and the pulse rate-Q.T. interval.

In the other cases that are indicated as significant, any differences noted might be due either to a difference between males and females or possibly to chance.

Table IX summarizes these inner correlations and, based on statistical confidence intervals, any indicated differences between the male and female studies are noted. The interpretation of these results should be made on the basis that we are only 95% sure that any one conclusion is true. That is, one time in 20 a false correlation (lack of) would be indicated by chance alone. On the other hand, a very large correlation such as .65 can be assumed to be real without much fear of contradiction.

In terms of the correlations relating the eight major variables to the T and U wave durations, not too much information was obtained. The dominant correlation seems to exist between pulse rate and the T and U wave duration time. Surprisingly, there also seems to be some relation between height, weight, and possibly the Q-T interval with the duration of the T and U waves, especially of the T wave.

Comment

AS A CONSEQUENCE of this correlation analysis, a need exists for obtaining a better characteristic measure of the T and U waves. Perhaps a similar type of analysis relating both the amplitude and the duration to some common measurable characteristic, such as the area of the T, U, or other waves might be more informative.

The differences in the appearance of the U waves in the different electrocardiograms have not been fully explained as yet. Most of these differences should be explainable in terms of physical characteristics. However, preparatory to the ultimate objective of relating characteristics of the waves to diseases, it must at first be ascertained that these characteristics are meaningful in respect to other known signals of danger, such as hypertension, heart strain, coronary artery disease, and similar positive electrocardiographic findings. These further analyses should be continued.

The lack of more positive results in this particular study would point to the need for a correlation study of a much larger number of electrocardiographic and disease summaries. Most correlations in this study are slight. To obtain a relatively precise estimate of their true significance a study such as this one should be repeated covering three to five thousand individuals.

Conclusions

1. ISOLATED U wave negativity in Leads 1, 2, and AVF never occur as the sole electrocardiographic abnormality. In our study, negativity of the U wave occurred in three instances in Lead 2, and in two instances in Lead 1. Three of these individuals had a disease of the heart or cardiovascular system. Two have no detectable diseases. One individual with an inverted U wave in Lead 1 showed electrocardiographic evidence of left heart strain and premature auricular contractions. Of the three cases with a negative U wave in Lead 2, one had changes consistent with hypertension and coronary heart disease, and the other of chronic coronary insufficiency, and left heart strain. One had no detectable disease.

2. U wave inversion is normal in Leads 3, AVR, and V1.

3. The lightweight person, not necessarily the tall, thin person, is more apt to have U waves of greater amplitude, but not of greater duration.

4. The U wave, when present, is higher in amplitude in the presence of hypertension, rheumatic heart disease, or premature ventricular contractions.

5. The U wave, as presently studied, is not a reliable or satisfactory index of heart disease because, when negativity occurs abnormally in certain leads, other more striking electrocardiographic abnormalities, or physical findings, are also present.

6. It is conceivable that further studies of the U wave, considering its area or other characteristics, as well as the aforementioned variables, may be more informative.

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Three Freedoms

THREE basic freedoms have supported the professional status of the physician: (a) freedom to act solely in the interest of his patient, (b) freedom of selection by physician and patient, (c) freedom to set his fee in the traditional manner. The traditional basis for the physician's fee has been: to each according to his need, from each according to his ability to pay. Sickness insurance changes this to: from each thrifty person a regular small premium and to the physician a fixed payment. Socialized medicine further changes this to: from the taxpayer an irrelevant tax and to the physician a bureaucrat's wage. Any impairment of the physician's basic freedoms debases his profession to the level of a trade. The positive health program of the medical profession is to regain and maintain its status as a profession.

—From "The Changing Philosophy of Physicians' Fees," by T. L. HYDE, M.D., in *Northwest Medicine*, August, 1954.

Women in Occupational Medicine

ADELAIDE ROMAINE, M.D., Medical Director
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THE TITLE of this article might lead one to expect a catalogue of those women who have made occupational medicine a career, or at least a series of biographical sketches of the most prominent members of this group. Actually, the endeavor to obtain an estimate of the number of such women and the work they are doing has been frustrating. I should like, therefore, to suggest as a more suitable title "Why Not More Women In Occupational Medicine?" and to state why this field offers women physicians a great opportunity.

Occupational medicine itself need not be described in detail at this time, but mention should be made of the tremendous growth and development of this special branch of medicine in recent years. We have seen the entire concept of the industrial medical program change. No longer is it little more than first-aid. Instead, it now attempts complete conservation of the individual. We are coming more and more to recognize that every industrial physician is expected to consider himself as part of the team which seeks to understand the entire person, weighing all those psychological and physiological factors that combine to produce the complex human being who comes to him for help. He may use consultants, laboratory tests, and other facilities to arrive at his diagnosis, but his first qualification beyond adequate medical training should be that he has a genuine liking for people and a desire to help them. At the same time, he must never allow the patient to feel that he is attempting to displace the personal physician. Instead, he should make it clear that he is desirous of helping both the patient and the patient's physician. Thus the industrial physician must be at all times aware of his threefold obligations: first, to the patients whose interests must be paramount, helping them to remain healthy mentally and physically; second, to management by placing employees in jobs of which they are physically capable and maintaining a close watch over their subsequent health; and third, to the physicians in private practice by making sure that the industrial physician supplements and does not supplant the care which the private physician gives his patients.

Where does the woman physician fit in this program? Suitably trained, I believe she is well suited for any industrial position: none is too large, none is too small. To begin with, women physicians are more painstaking, by and large, than are men. Perhaps it is their desire to make good in a competitive market; perhaps they are naturally more fussy over details. They do routine work uncomplainingly. Next, most employees will talk more freely with a woman than a man, possibly because the woman represents the maternal figure. Certainly the women with gynecological problems and the girls with menstrual difficulties will approach the woman doctor more readily. A third, and what is often an important factor to the physician herself, is the regularity of the hours of work with no necessity to cope with the problems of office routine and help. This is particularly desirable for the woman who is married; she can have some time for her personal housekeeping and family life. It would appear that women have a natural aptitude for this particular branch of medicine, and that it should have a special appeal for them, even though they might be doing the more routine occupational jobs.

WHAT about the higher level positions? In teaching, we have the outstanding figure of Dr. Alice Hamilton, whose contribution to the knowledge of industrial toxicology has never been equalled. She felt her sex was a help, not a handicap, when she started as investigator for the Illinois Commission on Occupational Diseases in 1910. "I have always thought it was easier for a woman in those days to deal with employers in the dangerous trades than it would have been for a man. Men do not resent a woman putting the welfare of the worker ahead of the product. They would despise a man for doing so."[1] We have come a long way in our treatment of workers since those days; nevertheless, this same personal concern exhibited by the woman physician is one of her most valuable assets. Dr. Hamilton became Professor Emeritus at Harvard's School of Public Health in 1935. Today Dr. Harriet Hardy is Assistant Medical Director, in charge of Occupational Medical Service, Massachusetts Institute of Technology.

Turning to the "in-plant" organizations, the medical division of the Federal Reserve Bank of New York was organized in 1918 by Dr. Mary M. Crawford, who directed it for over 30 years. According to Dr. Crawford[2] the Bank had taken on a great many women employees during the war. When the women did not return home after the war but continued to work, an advisory health service was established which expanded over the years to become a well-planned and complete Industrial Medical Department. This pioneer

Medical Department among the large banks of New York could thus be considered a direct result of women's entry into industry, thereby profiting both male and female employees. In the New York City area we now have a number of women Medical Directors. They represent the following organizations: Schraffts (Dr. Angeline Simecek); American Telephone and Telegraph Long Lines Division (Dr. Dorothea Lemcke); Burroughs-Wellcome (Dr. Mary Maguire); Hoffman-La Roche (Dr. Emma Kyhos); and myself as Dr. Crawford's successor at the Federal Reserve Bank. Women also hold important positions in the Medical Department of the Metropolitan Life Insurance Company, where Dr. Ada Chree Reid heads the chest service, and where Dr. Lydia Giberson has the title of "Personal Adviser to Employees." Dr. Giberson, a neuropsychiatrist whose experience and ability make her one of the unquestioned leaders in the field of industrial psychiatry, is not attached directly either to the Medical Department or to management, but acts as go-between in helping solve employee problems, whether related to health, working conditions, or emotional difficulties. When mentioning outstanding women in industry, one should not omit Dr. Hedwig Kuhn, of Hammond, Indiana, for her brilliant work in industrial ophthalmology. This list must of necessity be incomplete, and I ask the indulgence of those who may have positions of equal importance in their own communities, but of whom I have been unable to gain knowledge.

WHAT, THEN, shall we say to the woman doctor who is considering occupational medicine as her career? I would summarize as follows:

1. Occupational medicine has become an all-over service for the maintenance of the employee's physical and mental health. It thus requires the services of well-trained and well-oriented physicians.

2. Opportunities for specialty training are good, although few women have taken advantage of them.

3. The qualities of attention to detail, personal concern for patients, and dependability which are possessed by women would seem to make them particularly fitted for industrial work. The regularity of hours and work in turn should help make this work attractive to them.

4. The woman physician who goes into occupational medicine and really works at it can achieve a top executive position and have a most satisfying experience.

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"If I Had Seen You Yesterday . . . ."

MODERN industrial medicine emphasizes preventive rather than curative techniques. The real causes of many accidents, such, for example, as those resulting from emotional disturbance, are deep-rooted in the individual and not easily controlled. We know that if we were to dig deep enough we would discover what causes the emotional disturbance. The physicians are the only people who can do this. In one of our plants there was a man who had been operating a machine for 18 years without any accidents. Suddenly one morning he cut off two fingers of his right hand. On investigation we found there was no failure of the machine, or method, or design of the guard. In questioning the man, it was learned that his daughter, who was a spastic, had developed a serious cold, and he had had to call a doctor. He stated that during the incident he started to think that perhaps the child would be better off dead because she was such a problem to everyone and so unhappy herself. The next morning he came to work and had the accident. The plant physician told him about a special clinic to which the child could be referred and assured him that he would speak to the specialist to see what could be done. The man replied, "You know, Doc, if I had seen you yesterday, I wouldn't have cut off my fingers today."

—From an Address by P. W. LOGAN, of Liberty Mutual, at a Symposium on Industrial Medicine, Tulane School of Medicine, April, 1954.

Industrial Hygiene Foundation

Nineteenth Annual Meeting, November 17-18, 1954

THE Industrial Hygiene Foundation convened in Pittsburgh on November 17 and 18, 1954, for its 19th annual assembly. This pilgrimage provides opportunity for industrial management to meet with industrial Medical Directors and other industrial physicians and industrial hygienists. Not properly may may it be stated either that industrial managements sit as students at the feet of the occupational health workers or that the occupational health workers sit at the feet of management. Rather these conferences provide discussion on a level of equality with all in attendance gaining in the process. In this respect the Industrial Hygiene Foundation's annual sessions are almost unique. Long complaint has been that too many meetings of occupational health workers represent discussions only among themselves on topics usually well known to all and with little gain. Likewise industrial management in its assemblies rarely is concerned with occupational health and any participation by industrial hygienists or physicians is exceptional. The Industrial Hygiene Foundation in its annual meeting reduces these several professions to an easy going common denominator.

Fully it is understandable that these annual assemblies must be limited to the Foundation's members together with relatively small numbers of invited guests. Physical facilities alone prevent any other practice. Great is the regret that all of management might not share in the Foundation's deliberations and that all industrial physicians and hygienists likewise might not be in attendance. Quickly that statement reaches absurdity, but something salutary is implied.

Members of both groups privileged to attend and participate become occupied in two planes of discussion. The first of these is the general discussion in the auditorium of the Mellon Institute; the second, or the highly technical groups, meet in small rooms for the delineation of immediate difficulties and usually reflecting newness. In these meetings the technical representatives of industry, the industrial hygienists, meet with their peers from other industries, and governmental and teaching agencies.

In the general sessions appropriate time is devoted to the reporting by the Foundation staff and officers on its past year's activities and attainments with some preview of things to come. Otherwise these general sessions are pointed to over-all policy thinking and inspirational addresses which by design not always are acutely shaped to occupational health. It is fair to assert that within the discussions of these two types of meetings, much that is new and much that is imperative appears, and that all considered the programs themselves reflect the state of industrial hygiene within industry. Some proof of this assertion appears in the topics of the medical conference under the key caption "Industrial Health Problems of Tomorrow," the specific items being: "Alerting the Industrial Physician" by Dr. F. B. Lanahan; "Hazards of Radioactive Materials" by Paul E. Smith, Jr., and Dr. Allan J. Fleming; "Re-evaluating the Physical Examination in Industry" by Dr. M. N. Newquist and Dr. O. T. Mallery, Jr.; and "The Problem of Overweight in Industry" by Dr. Joseph T. Beardwood, Jr.

Ready to open the program (left to right): Andrew Fletcher, President, St. Joseph Lead Company, and Foundation Board Chairman; Clifford F. Hood, President, U.S. Steel Corporation; Dr. C. Richard Walmer, Foundation Managing Director; Dr. Edward R. Weidlein, President, Mellon Institute.

Physical examinations were revaluated by (left to right): Dr. O. A. Sander, Associate in Medicine, Marquette University, and Medical Conference Chairman; Dr. O. T. Mallery, Jr., Director, Institute of Industrial Health, University of Michigan; Dr. M. N. Newquist, Medical Director, The Texas Company.

Management aspects of industrial health, were presented by (left to right): Dr. Donald A. Covalt, Institute of Physical Medicine and Rehabilitation; Dr. Norbert J. Roberts, Medical Director, Pennsylvania Railroad; A. L. Kirkpatrick, Insurance Department, Chamber of Commerce of the United States; and Dr. Richard D. Hoak, Senior Fellow, Mellon Institute.

Speakers at the Engineering Conference (left to right): Dr. W. F. Faragher, Consultant, Oxy-Catalyst, Inc.; Burgess P. Wallace, Research Director, Whitehead Brothers Company; H. E. Kieweg, General Manager, Production Department, Biochemicals Division, Commercial Solvents Corporation; B. R. Small, Staff Engineer, Aluminum Company of America.

Dr. Lanahan predicted the doubling of our standards of living by 1975 although a gain of 40% in the quality of our living standards already has been achieved in the past 25 years. The newness of the living and working environment will result from the miracles of electronics and radiation that already are becoming commonplace. These changes will require adjustment and some adjustment must be directed to the rising tides of chronic diseases incident to prolonged life. Dr. Lanahan predicted increased automation both in the work and the non-work environment that may bring about changes in the stress of workers. At the present time it is not clear that less physical stress will assure less psychic stress. Increased leisure appears as a prospect but scant plans now exist as to the constructive use of leisure in order to avoid sheer wastage of energies.

Mr. Paul E. Smith, Jr., and Dr. Allan J. Fleming implied in the midst of many technical considerations that at least in industry future developments may make potential radioactive material exposures as commonplace as carbon tetrachloride or carbon monoxide. Stronger assertions were to the effect that there are opportunities for damage not to be neglected but with available protective remedies withal.

The team of Drs. M. N. Newquist and O. T. Mallery, Jr., reappraised the values of physical examination in industry. While emphasis was directed to those things inescapably important in such examinations, the inference was that many initial examinations as conducted in industry are not commendable because of limits in intended scope although possibly suited to preliminary requirements of placement. It is perhaps true that a new term should be coined such as "basic replacement physical examination," thus paving the way for more deliberate procedures as indicated by the initial observations.

Dr. Joseph T. Beardwood, Jr., in his address took notice of the immensely increasing numbers of those overweight in industry, both men and women, partly resulting from a much bettered economic status of industrial workers and the evil consequences that readily become possible and with special reference to diabetes.

The desire is to mention by title and speaker every item throughout these two days in support of the assertion that this congress was notable. Lacking opportunity in space, mention without comment as to content is limited to the following items uniformly reporting new developments or new concepts: "The Biologic Testing of New Materials of Fine Particle Size" by Dr. Paul Gross; "Recent Developments in the Industrial Toxicology of Vanadium" by Dr. H. E. Stokinger; "The Newer Welding, Burning, and Soldering Processes and Possible Health Hazards Which May Result from Their Use" by J. W. Kehoe and John J. Ferry; "Synergism in Occupational Exposures" by Dr. William G. Fredrick; "Horizons of Industrial Medical Services" by Dr. Norbert J. Roberts; "Total Rehabilitation—A Problem for the Patient, Physician, Management and the Community" by Dr. Donald A. Covalt; and "Medical Evaluation of Noise" by Dr. C. Stewart Nash.

Potential industrial health hazards were pointed out by (left to right): Dr. F. B. Lanahan, Medical Director, Electric Storage Battery Company; Dr. Allan J. Fleming, Medical Director, E. I. du Pont de Nemours & Company; Paul E. Smith, Jr., of Du Pont's Haskell Laboratory for Toxicology and Industrial Medicine.

Mobile Industrial Medical Clinics

INDUSTRIAL operations in some parts of the world are such that the conventional types of industrial medical services are not always suitable or applicable. This is the situation, as to some of the activities of the Arabian American Oil Company, in Saudi, Arabia. To meet unusual medical requirements, an unusual practice has been instituted. A description of this practice becomes the objective of this brief presentation.

THE THREE communities that have grown up in the Eastern province of Saudi Arabia as a result of the Arabian American Oil Company's operations are basically distinguished from each other by the specific oil industry function that each performs. Ras Tanura is the site of the Company's 200,000-barrels-a-day refinery and the Persian Gulf tanker terminal. The Company's headquarters are at Dhahran, and consequently a major part of the work carried on there is administrative. Abqaiq, located some 40 miles inland from Dhahran, stands on a barren sandy waste below which lies a large amount of the crude oil that is Saudi Arabia's greatest source of wealth. The community is the center of the producing activities and this has meant that, unlike Ras Tanura and Dhahran where the work areas are fairly compact, Abqaiq employees work in widely separated installations.

For the Medical Department's personnel in Abqaiq, this has created problems in handling emergency cases that may occur on the job. Clinics such as were centrally located in the industrial areas of Dhahran and Ras Tanura were not possible here. To provide service for the Abqaiq employees, the physicians decided that since it was difficult for the personnel to come to a clinic, the clinic should travel to the personnel.

Mobile medical attention is not new in the Arab East. In twelfth-century Baghdad a sultan provided an Arab physician with a field hospital which was transported about the country on the backs of 40 camels.

The answer to the Abqaiq medical problem is three mobile clinics. Each works within the limits of a certain area, with three or four waiting stations. A schedule has been established so that all employees know at what times during the day the clinics will appear at the waiting station nearest where they work. The mobile vans tour all day, calling at each station as long as possible.

The clinics are designed to handle simple ailments and minor injuries only. Should an employee report a serious injury, the nurse in charge immediately gets in touch with the supervising physician and calls the main hospital for transportation to take the patient there. The advantages of these installations are two-fold. First, the employee is able to obtain medical attention and treatment for minor injuries at a location convenient to his work. The second advantage is for the physicians. By relieving them of minor cases for which adequate treatment can be given by a trained nurse, they have more time to devote to caring for patients in the hospital. The mobile clinics which have been operating for about six months are proving a workable solution to Abqaiq's problem of decentralized operations.

In addition to these mobile clinics, the Abqaiq Medical Department has set up an emergency check-point to provide medical care for employees after working hours. Located in the middle of

Patients line up at the first aid waiting station at Abqaiq for medical attention. There are four such stations throughout the oil fields. The mobile clinics—three of them—are proving a workable solution to Abqaiq's problem of decentralized operations.

First aid to an injured oil worker. Mobile clinic is equipped to handle only simple ailments and minor injuries. More serious cases are brought to Ras Tanura and Dhahran hospitals for medical attention by Aramco physicians.

Mobile clinic van stopping at first aid station near a power house at Abqaiq.

American trained Saudi nurses and technicians treat the sick and injured.

Saud Ben Kazen, Saudi trained nurse, treats an oil worker for a minor injury. Kazen has been in Aramco's Medical Department for 14 years. Worker at right awaits his turn.

the general employees camp, the check-point remains open from 3:30 in the afternoon until 7:30 the next morning, the hour at which the work day begins. The check-point is also open through the day and night on holidays, and on Thursday afternoons and Fridays when the Arabs have their "week-ends."

This check-point, however, unlike the clinics, is only a means of communication between the patient and the hospital. The nurse on duty is assigned to contact the duty physician for transportation of the employee to the hospital.

In Dhahran, as in Abqaiq, there are emergency check-points to provide communication after working hours between a nurse on duty and the hospital. In Ras Tanura, the Rahaima hospital is located in the middle of the camp for general employees so that there is little delay getting a patient from his room to hospital care.

The Saudi employees, for whom these services were mainly designed, have reacted favorably, and the three white-painted vans of the Abqaiq district are already a well-known, if movable landmark.

IN THE fields of both curative and preventive medicine Arabian American Oil Company provides health facilities for nearly 6000 American oilmen and their families, and for many thousands of Saudi employees. The medical staff consists of 52 physicians, 158 nurses, 104 technicians, 287 nurses helpers, 94 clerks, and 75 others.

The new Dhahran health center, established by Aramco for its employees, contains an outpatient clinic, medical laboratories, and a 40-bed hospital.

From the Archives

IN OCTOBER, 1917, Dr. Franklin Martin, Chairman of the Medical Section of the Council on National Defense, organized a Subsection on Industrial Medicine. According to Dr. Mock, "This committee proposed elaborate plans for the supervision of the health of all workers engaged in essential war occupations. Few of those in authority were familiar with this new field in medicine, and it took weeks and weeks of patient endeavor to sell the idea." On May 27, 1918, Dr. Otto P. Geier, who was the Director of the Committee, submitted an excellent report on "Industrial Medicine and Surgery as a War Measure." During this year also, Dr. C. D. Selby made an extensive survey, under the Working Conditions Service, of industrial establishments in both the United States and Canada which was published by the U.S. Public Health Service as Bulletin No. 99 (1919) entitled "Studies of the Medical and Surgical Care of Industrial Workers."

—From "Industrial Health," edited by GEORGE M. KOBER and EMERY R. HAYHURST, P. Blakiston's Son & Company, Philadelphia, 1924, page iv.

The Nurse in Industry

UNIVERSITY OF MICHIGAN DISCUSSIONAL OCTOBER 15-17, 1954, ANN ARBOR

Reported by JEAN SPENCER FELTON, M.D., Associate Professor in Medicine
Associate Professor in Preventive Medicine and Public Health
University of Oklahoma School of Medicine, Oklahoma City

WITH the continuing utilization of nursing personnel in industry, it has become recognized that this personnel is in need of a structured educational program. Such awareness prompted the Discussional on "The Nurse in Industry," held at the University of Michigan, Ann Arbor, October 15, 16, and 17, 1954. Sponsored by the American Association of Industrial Nurses, the meeting had as its hosts the University of Michigan Institute of Industrial Health, in cooperation with the Michigan State Association of Industrial Nurses.

These were the purposes of the session:

1. To define the problem areas in:
   (a) preparing the nurse for her contribution to health conservation;
   (b) helping develop her knowledge, skill and judgment;
   (c) helping to establish desirable professional relationships.
2. To recommend possible approaches whereby these problems may be solved.

Employing the group discussion method, in this situation more realistically termed *work*shop technique, those attending were divided into three work sections aimed at studying these subjects, as related to the stated purposes:

1. The Industrial Nurse's Contributions to Health Conservation.
2. Her Knowledge, Skills, and Judgment.
3. Her Professional Relationships.

Components

OF GREATER interest than method, however, was the composition of the group. Brought, as its members were, from varying compass points, the contributors to the session represented several disciplines and categories within industrial health. Nursing had as its representatives, members of the Board of Directors of the American Association of Industrial Nurses, of its Committee on Education, of the nursing faculty from the University of Michigan, in addition to general nurse educators actively engaged in teaching in collegiate schools of nursing, those performing nursing functions in industry, consultants from official health agencies, and a representative from the National League for Nursing.

As additional resource persons, there were physicians with university medical school appointments, and those engaged as full-time Medical Directors in industry, also directors of industrial relations and safety in manufacturing plants.

To lend international flavor was the Senior Nursing Consultant in Occupational Health from Canada's Department of National Health and Welfare in Ottawa.

Targets

THE objectives of this learning mission were the establishment of instructional ways and means for both the student nurse and the graduate, in industrial nursing practices. The role of the nurse in commerce and industry has been identified well, but problems remain in the preparation of the undergraduate nurse for her future acceptance of this role, and for its maintenance by the industrial nurse in the practice of her skills on the job. As it happens in many professional situations, the acquisition of new knowledge by a practitioner varies inversely with the number of years following receipt of his degree. It is hoped that methods in postgraduate education for the in-industry nurse can be developed to forestall this learning lag in the future.

The final reports and recommendations of the Discussional participants will be reviewed by the A.A.I.N. Board of Directors, and it is anticipated that a scheme for early implementation of these recommendations will be born.

Leaders

TO PERSONALIZE the meeting, its leaders should be mentioned. Miss Catherine Dempsey served as presiding officer, and the three groups were led in their discussions by Miss Mary Louise Brown, R. N., Miss Hazel Midwood, R. N., and Miss Marion Castrodale, R. N. Miss Sara P. Wagner, R. N., as President of the A.A.I.N., will carry the burden of final formulation of the deliberations.

It is with this crossover of ideas, this sharing by several disciplines, and this ardent pursuit of a task to a conclusion, that the work of our scientific world can best be performed.

The American Academy of Occupational Medicine

Report of the Committee on Education and Certification

THE ASSIGNMENT of this Committee is to consider and recommend types of training for physicians in the special field of occupational medicine.

At the present time there is general agreement that this training must consist of two essential parts:

1. The academic and clinical, and
2. The in-plant or field training.

The academic and clinical training is to be carried out at an appropriate center within a university and is to be followed by a year of supervised work in an industrial plant or comparable field facility.

The past several years have witnessed substantial progress in the direction of developing uniform curricula at the several universities. The Committee feels that it can direct its efforts more profitably toward outlining the year of field training.

The outline for the post-academic year of training is presented in the sections that follow.

I. Definition

THE graduate training referred to in this report is that which will prepare a physician for the specialty of occupational medicine.

The post-academic year of training is one which provides the practical application of the principles of occupational medicine presented in a graduate course at a university. It is a component part of the total graduate training course for which the university bestows recognition.

It is recognized that the preceptorship type of in-plant training and brief training course serve needed and useful purposes for many physicians and industrial concerns, but these are not under discussion here. Such training should be discussed in a later report by this Committee.

II. Purpose

THE physician trainee needs an opportunity to develop himself, within a setting representative of that in which he will carry on his chosen profession. Through performance rather than instruction, the post-academic year is meant to stimulate in the student:

A. A familiarity with the techniques of the clinical, laboratory, and statistical sciences as these are applied in a program of preventive medicine in an employed population.

B. An appreciation of the art of clinical practice in the non-traditional situation in which the physician is not specifically chosen by those whom he serves.

C. A discernment of the relative importance of health problems.

D. An understanding of the workmen's compensation laws and the industrial physicians' responsibilities therein.

E. A comprehension of the need for teamwork in rehabilitation of the handicapped, whether the handicap be medical or surgical, occupational or non-occupational.

F. A recognition of the fact that the concern of the physician is the study and understanding of man and not merely of disease.

III. Training Location

THE post-academic year of training is to be provided at facilities approved for such training by the Academy's Committee on Standards. It is felt that such facilities will, for the most part, be located within industrial organizations, but they may be located within certain governmental health agencies, or within organizations serving industry.

The importance of supervision and guidance during this post-academic year of field training is stressed. The student physician is to be provided with a written program of work in which the details of his duties are outlined, the responsible supervisors named, and the time planned for each procedure is specified.

IV. Training Content

A. INDUSTRIAL MEDICAL PRACTICE (40 to 60%):

1. Prevention:
   - (a) Environmental Hygiene:
     1. Physical.
     2. Chemical.
     3. Infectious disease control.
   - (b) Clinical Examinations:
     1. Routine: pre-employment; periodic; post absence; retirement.
     2. Special: hazard; transfer; disability evaluation; case finding; miscellaneous.

(c) Early Case Finding by Survey Methods.
(d) Health Education:
1. nutrition and diet;
2. habits of work, exercise, recreation, rest.
(e) Mental Health.
(f) Participation in Accident Prevention Program.
(g) Participation in First Aid Training.
(h) Supervision of First Aid Stations.
(i) Civil Defense.
(j) Medical Department Record System.

2. Treatment:
(a) Minor Surgical.
(b) Minor Medical.
(c) Minor Psychiatric.
(d) Physiomedical.

3. Rehabilitation:
(a) Medical.
(b) Surgical.
(c) Psychiatric.
(d) Vocational.

4. Professional Relationships and Consultations:
(a) Within the Department.
(b) With the Private Practitioner.
(c) With the Health Agencies.

5. Compensation Law and the Part of the Industrial Physician in its Administration.

B. OPERATIONS (20% to 40%):

1. Materials flow:
(a) Raw Materials.
(b) Processes.
(c) Products.
(d) By-products.
(e) Wastes.

2. Industrial Hygiene—Field and Laboratory Experience:
(a) Types of Surveys.
(b) Sampling and Analytical Techniques—Their Uses and Limitations.

3. Plant Safety:
(a) Personal Protection.
(b) Mechanical Methods for Industrial Protection.
(c) Engineering Methods for Group Protection.

4. Sanitation: Services and Facilities:
(a) Waste Disposal.
(b) Atmospheric Pollution.
(c) Stream Pollution.
(d) Feeding Establishments.

C. ADMINISTRATION (10% to 20%):

1. General Business Policies and Practices of the Company.
2. Industrial Relations Policies and Practices.
3. Medical Department Policies and Practices.

D. RESEARCH (0% to 10%).

—Committee on Education and Certification:
D. J. LAUER, M.D., Chairman.
C. A. D'ALONZO, M.D.
A. G. KAMMER, M.D.
J. L. NORRIS, M.D.
FRANK PRINCI, M.D.

Increased Leisure

FOUR-DAY WEEK—Panacea or Disaster? Neither, we think, but probably inevitable. This strangely touchy subject—strangely because like any other business problem it should be a matter of logic, statistics and sober thinking rather than emotional hysteria—is coming in for more and more attention these days along with those other two labor bugaboos, guaranteed annual wage and co-determination. Like the five-day week before it, the four-day week inspires fright and outrage in far too many management circles (not natural, will wreck the economy, against God's laws, pampering, laziness, etc.,) and dreams of a golden-age in far too many labor circles. Discarding emotion, AIM feels that the concept is both sound and inevitable if our production is not to outstrip our consumption. The only other answer is to step up sales to the point where everyone is buying too much of what they don't need. Already some unions are calling for 30 hours a week, or 35, and managements are reluctantly seeing the handwriting on the wall. But to AIM the problem is not one of fighting the four-day week or encouraging it, but rather of setting in motion plans to utilize the extra leisure time that will be ours when it does come. The same problem came up with five-day week, was not met. So far no one doubts that the five-day week increased spending, helped the economy, but it has not led to the development of better citizens. That should be the goal of increased leisure if we are to remain a powerful, democratic nation. This was not the fault of the five-day week. Blame must be laid directly at the door of management and labor in not seriously attempting to channel this time into fruitful paths. One of the greatest faults of management today is that while top-management is relatively busy in civic work and improvement, only a few companies are trying to bring the idea of civic duty down to the employee level. The four-day week offers management another opportunity to get in the fight and encourage a significant use of leisure time. It is far better for management to stop tilting at windmills and to begin planning how it can help its employees constructively utilize their leisure time.

—American Institute of Management, *Quarterly Bulletin*, 4:9 (November) 1954.

Treatment in the Factory

Debate between Professor Davies (Leeds) and Dr. R. E. W. Fisher (London)

PROFESSOR DAVIES (Professor of Public Health, University of Leeds): It seems to me that there is a great deal of discussion and disputation going on about the Industrial Health Service. To a Medical Officer of Health it seems that the Industrial Health Service consists of three parts which, for the sake of clarity, must be considered distinctly.

The first is a Treatment and Rehabilitation Service, which includes emergency treatment.

The second comprises the environmental and preventive health services.

The third is concerned with the question of research into new and existing hazards and various aspects of working conditions.

I believe that these three must be done by specialists in their respective branches; they cannot be done at the same time by the same person. The training required for each is different, the method of application to industry is different, and, indeed, it requires a different type of doctor to deal with them. To me, therefore, the three divisions are quite distinct. I hear a great deal from industrial medical officers, in public and otherwise, that the Occupational Health Services are chiefly preventive; but you find treatment and specialist clinics, special treatments of all kinds, chiropody, orthopedic, and so on. At a recent exhibition we saw pictures of magnificent surgeries, x-ray, and various treatment services in the factories.

We have the National Health Service, and whether we like it or not it is here to stay and to expand. Treatment is the prerogative, the function and duty of that Service. The Industrial Health Service must fit in with that Service and work with it, it must be a part of it, and it is unrealistic to talk of any other form of separate service for industry. There may be exceptions, special circumstances with regard to great national industries, but the main channel of the Health Service for industry must be the National Health Service.

There is a feeling that the Industrial Health Services are already developing more or less on their own and there has been a move from industrial medical officers to alter one or two rules of the British Medical Association. The industrial medical officer wants to be given a free hand to undertake treatment in factories—this from a service which is talking a great deal about the preventive aspect of occupational health. In the beginning, of course, it was said that they wanted just to carry on a little way, they did not want to undertake full treatment and, of course, it was to be done with the permission of the family doctor; that was always put very carefully. What it really amounted to was that the industrial medical officers wanted to carry out investigation and treatment in their factories from the very beginning and to continue to do so. That is bad from a medical point of view, from the point of view of medical politics, indeed from every point of view I can think of.

First, it is obviously impinging on the duties and functions of the National Health Service. If we think of the legislation which has to do with industrial health, in the Factories Acts, the Disabled Persons Employment Act, and so on, we find that it demands a certain kind of advice. It runs through the whole of these pieces of legislation, it is of a preventive nature, and of assessment of capacity for work, or incapacity as the case may be. This is demanded from general practitioners and from specialists alike; it is advice which is absolutely essential and which, indeed, the medical profession has to be trained to give. They are certainly not trained at the moment to give such advice, not as undergraduates, at any rate; if it is given at all it is as postgraduate education.

We cannot disregard the National Health Service. Millions of pounds have been spent, particularly in the Hospital Service, and we have produced the finest hospital system in the world. We cannot set up a second-rate sub-standard service in our factories. The Act says that the proper function of the hospital is specialized investigation, treatment and medical care.

Many will remember the arguments brought against the old medical superintendent of the old Poor Law infirmaries, and later the local authority. One of the arguments which it was most difficult to refute was that he was a bit of a jack-of-all-trades. He did a bit of obstetrics, a bit of children, a bit of surgery, of administration, and medicine, and it was said over and over again that one man could not do all these things. I say that the industrial medical officer is going the same way. He will become a jack-of-all-trades—a bit of surgery, a bit of x-rays, and so on. I am given to understand, although I am no expert in this matter, that there are industrial medical officers who do their own x-rays, who do special major surgery. I do not say that they should not do it, they do it quite well so far as it goes. They do a bit of orthopedics, a bit of dermatology. That I think is bad. People needing specalized treatment should go to the proper place, that is the function of the National Health Service.

If we set up such a separate service—and let us be quite clear about it, this move to carry out treatment by the industrial officer is just that—it will lead to the formation of a separate Industrial Medical Service with an obvious duplication of service. You can, if possible, draw some kind of arbitrary line between emergency treatment and continued treatment. It can be said that once the emergency is over the individual can go either to the hospital or to the general practitioner, but once it is said that the industrial medical officer will continue to treat it seems that as medical men we have to

From *The Transactions of the Association of Industrial Medical Officers*, London, England, January, 1954.

say all or nothing, because once the emergency line is passed there is no other line which can be drawn. It must be all or nothing. What industrial medical officers are saying is that they want to set up a separate therapeutic service in all branches apart from the National Health Service. I think it is economically unsound. There may be wealthy and large industries which might afford it, but as a national system it is impossible because it is a duplication of effort and we have not the manpower to do such a thing. . . .

I have tried to find out from industrial medical officers the sort of service they mean. There are a great number of statutory functions which must be carried out by industrial medical officers; they are carried out at the moment by the Medical Inspectorate, by the appointed doctor, or by the humble Medical Officer of Health—all these act statutorily. Not only are they impartial but they have the appearance of being impartial. One of the points brought forward by the industrial medical officers was that they wanted to take in all these functions in this rather vague and large-scale Industrial Health Service, but they still wanted to be appointed by the management. I do not understand that at all. I do not understand how you can administer medical Acts of Parliament when you are employed by managements who are interested parties. I am not employed, fortunately, in that capacity by the City Council of Leeds. It is true that they have to pay my salary but I do administer the Act of Parliament impartially and the City Council cannot say to me "You must carry out your duties under the Act." They are there to be carried out and they must be carried out. The industrial medical officers say that they are never subjected to interference, that they are allowed complete freedom in medical matters. That may or may not be true. It may have the appearance of being true, but I do not think the extended duties which are necessary in industrial health matters can be carried out according to the standards which have to be laid down by legislation and enforced by administrative methods, unless the service is separate and distinct.

What, therefore, are we left with? If this idea of continued treatment is carried out, the formation of a separate Industrial Medical Service is inevitable, leading finally to a State National Service. It is not for me to say whether that is good or bad, but in my opinion the function of an industrial medical officer is preventive and the less he has to do with treatment the better. I say this because the Medical Officers of Health in the course of their long and arduous experience went through this stage long ago, and it was considered so important that the Medical Officer of Health should not carry out treatment that in the Public Health Act, 1936, in the National Health Service Act, 1946, there are sections which prohibit the establishment of a domiciliary treatment service by the local authority over which the Medical Officer of Health has any jurisdiction. It is the same with the School Health Service. It has been a long argument that it is not the function of the School Health Service to treat disease, and I believe that is true. There is a great deal of work to be done in the preventive services without going into the realm of treatment.

DR. R. E. W. FISHER (Chief Medical Officer, South-Eastern Gas Board): It is not possible for me in the time available to deal in detail with Professor Davies' statement of his point of view if I am to put my own. There are one or two points, however, which I must pick up. Surely I must join issue with him when he divides medicine into three pieces. Gaul was divided into three parts but, if I may say so, the divisions were notional and not real, and although you may divide medicine into three parts: first, treatment (including rehabilitation); second, research; and third, environmental and preventive medicine, you will stultify it. Medicine does not deal with a man in three pieces but as a whole, and a doctor who is any good must have his eye on the whole field of medicine. He may concentrate on one part or another, but unless he has his eye on the whole of medicine he is no good. I cannot therefore let Professor Davies get way with this differentiation.

One other point I cannot let pass. Professor Davies says general practitioners and hospital services are required to advise on fitness for work. He might get away with that in company with general practitioners and clinical specialists, he might perhaps get away with it in a company of industrial medical officers, but never, never, in a company of works managers. At least, general practitioners and hospitals may be required to advise on fitness for work but just how effectively do they do it? I think we all know the answer.

Professor Davies says that treatment must be all or nothing, that if we start treating a man and do not stop at emergency treatment we must go on to the end. With great respect, who does that in these days? Does the general practitioner treat a man when he has a cold? Yes. Does he treat pneumonia? Yes, perhaps, sometimes. And when the pneumonia gets worse and the man develops an empyema, does he treat that? I do not think so; as a general rule the man finds his way into hospital. The general practitioner says "This is past my resources." The hospital doctor treats the man until he is fit to go out and then he is passed back to the general practitioner.

If we treat a man while he is at work we are faced with the argument, what do you do if the man stays at home? How will you continue your treatment? But we shall not treat him; he is not at work. We pass him to the general practitioner for treatment in the same way that the general practitioner passes him to the hospital and the hospital passes him back to the general practitioner in due course. To say that the general practitioner and the industrial doctor are not under the same Service, that they cannot cooperate and that it is not possible to pass a patient from one to the other is not facing the facts; I can assure Professor Davies, it not only can be done, it is done regularly. . . .

I take my stand on the fact that I am a doctor and as such I have the duties and rights of a doctor. The industrial doctor is not a sort of second-rate doctor nor is he a doctor without a doctor's rights. As I see it, if a man comes to me and places himself voluntarily under my care, then I am entitled to give him such care as I can. I am breaking no ethical law of my profession by so doing and no other doctor is entitled to forbid me to do so. That is the principle on which I stand and from which I make my case.

Apart from this principle, there are, of course, practical arguments in favor of treatment at work. For instance, there is the obvious argument that a man should not lose time to go and get treatment from a general practitioner when he can get it at work. There is the argument that an industrial doctor cannot establish the confidence of his men unless

he is prepared to deal with them as a doctor, and if he does not establish their confidence he might as well not be an industrial doctor. These are, however, arguments about the efficient way of doing things, not points of principle.

My case stands on a question of principle, of the doctor-patient relationship. I am not prepared to accept the claim that the general practitioner alone stands in a doctor-patient relationship to my patient; that is an idea which does not conform to the facts. In theory there was once a Golden Age when every man had his own family doctor. The doctor brought him into the world, circumcised him, vaccinated him, cut his tongue tie, treated him for all ills. If the doctor wanted a second opinion there was a consultation. The consultant arrived in his carriage, gave his top-hat to the parlour-maid and went upstairs with the practitioner. After the examination there was a consultation behind closed doors; the consultant advised, the practitioner prescribed, the consultant received his golden guinea and departed. The practitioner was still in charge.

That was the theory and perhaps the reality, although I wonder if it always applied to the man who had no parlour-maid to receive the consultant. Anyone who thinks that that situation exists to-day is living in a world of his own. To-day a man has not one but a number of doctors. He is born in a maternity hospital or under the care of a midwife; the doctor who supervises the midwife is not even always his mother's panel doctor. As a school child he is cared for by the school health service. Here I would like to digress for a moment. Professor Davies told us that the local authority medical officers must never on any account have anything to do with treatment. It follows that the school health service should eschew all treatment as the plague. But what, in fact, are the duties of the school health service? I have here a book of reference which states that they include, among others, the supervision of school buildings and equipment, the medical supervision of all pupils, the supervision and medical care of handicapped children, the supervision of treatment by school clinics and otherwise, dental, medical, skin, treatment of errors of refraction, remedial and other matters. This is no irresponsible publication. Its title is, *A Handbook for Health Visitors and Social Workers*, and one of its authors is no less a person than Professor I. G. Davies. To return to my argument. As a schoolchild, then, he is treated at the school clinic. If he should develop tuberculosis he is cared for at the T.B. clinic. If he falls off his scooter he is treated by the casualty officer at the nearest hospital. Now, in theory not one of these services may lay a finger on him without the prior knowledge and consent of his general practitioner.

That is the theory; but what if he has no general practitioner? Then no one may do anything for him until he gets one. (Suppose he does not want a G.P.? How many men are there who do not want a G.P.? How many times do we hear that the patient wants nothing and expects nothing from the G.P. but a certificate or letter to the hospital?) The theory is that the G.P. is the doctor who knows all about his patient. He knows so much that the V.D. clinic may not give an injection without first consulting him; his knowledge is so wide that the T.B. clinic may not induce a pneumothorax without his consent; his knowledge is so deep that the industrial doctor errs grievously if he advises his patient to avoid heavy lifting—that is treatment—without reference to this paragon of insight and knowledge.

Now, what kind of person is this paragon? Let us have a look at him. I do not mean in theory or as he should be or as he once was or sometime may be, but as he is now. The facts do not match with the theory. One in three G.P.s cannot or does not examine his patients properly, one in 15 never examines any patients at all in any circumstances whatsoever, and one in 10 has no examination couch. If he examines the chest he rarely bothers to look at it or percuss it; when he examines the abdomen it is often done with the patient fully clothed or standing up. This kind of examination is not always due to lack of time, because one G.P. in every three has enough time to undertake other paid work in addition to his practice. These are not fancies and this is not what G.P.s do when they are at their worst; this is what they do when they are on their best behavior. This is what they did when Dr. Stephen Hadfield of the British Medical Association was watching them. Now that Dr. Hadfield has blown the gaff on general practice, is it surprising that many patients come to their industrial doctor to ask for a medical examination? Such patients do not want us to get in touch with their G.P. for they have no doctor-patient relationship with him. It is a mere capitation fee relationship. It is nonsense to suggest that an industrial doctor should consult such a G.P. before giving the patient the treatment that he needs, asks for and cannot get from the G.P.

Of course there are many excellent general practitioners. It is my pleasure and my honour to work with and cooperate with them; men who examine their patients gladly and properly and look after them well and honestly. With such general practitioners the industrial doctor is only too happy to cooperate. An industrial doctor who did not cooperate with such general practitioners would be handicapping himself in his work and would not be doing his best for his patient. It is not necessary to make rules about this or to tell the industrial doctor to do something which he will certainly do in the exercise of the ordinary ethics of his profession. Equally, it is not necessary to make ethical rules to say that doctors who are single men and working as assistants for married general practitioners must not make love to their principal's wives. So far as I know there are no ethical rules to say that a doctor may not carry out dangerous experiments upon living human beings—it would not be a bad idea if there were. Perhaps it would be better if the Ethical Committee of the B.M.A. were to concern itself with that kind of thing instead of with the imaginary transgressions of industrial medical officers.

I am a doctor, the patient is there and if the patient chooses to come to me no person has the right to say him nay. The leaders of our profession are charged with the guardianship of our good name. If it is not to be trampled in the mud of the market place it is time that the needs of our patients and the treatment of their ills took precedence over huckstering and chaffering over a list.

Employment of the Physically Handicapped

CHANGES in workmen's compensation laws and in union security provisions, to increase the safe and profitable employment of the physically handicapped, were proposed by a panel of the President's Committee on Employment of the Physically Handicapped.[1]

Safety was considered to be the most important factor in employing the handicapped. Although the panel recognized the progress made under existing programs, more guidance from the medical profession was needed, as was also the "imaginative know-how" of the safety engineer to overcome the obstacles that prevent the physically handicapped from becoming self-supporting. To obtain such aid, the panel noted, is more difficult for the small employers than for the large companies. For example, one large corporation employs over 100 full-time physicians whose duty it is to "know the physical and the mental requirements" of each job in the plant.

Statistics have proved that the handicapped worker is a safe worker; yet a safety engineer can save his company money by developing an effective safety program. Under one such program, a guard was devised to prevent a blind worker from putting his hands in a sheet metal roller. The able-bodied worker also benefited, because the guard became standard equipment on "one of the most dangerous machines in industry."

An evaluation of the safety record of the physically handicapped as well as the able-bodied workers was made by a panel member from industry. He found that among the physically handicapped who had been in the employ of the company for many years not one of about 250 workers with one eye had had a serious accident to the other eye. The safety program was partly responsible for this record, but the individual himself was also responsible. Nor, over a period of 40 years, had there been a single serious accident among the entire group of physically handicapped who had lost members. "We have all types of chronic diseases, we have all types of people who have been afflicted because of accidental conditions arising outside of the organization, and, with the entire group together," he concluded, "we still maintain what we consider a good safety record."

Workmen's Compensation

CITING the addition of a quarter of a million physically handicapped to the millions already suffering from some disability, one panel member recommended a completely new approach to the rehabilitation of the handicapped. "All of our state workmen's compensation laws must be amended," he said, "to include provisions for modern rehabilitation centers. These laws should include a complete guarantee to the employer who is willing to hire a physically handicapped person that he will not be charged with the full payment of compensation for such claims. A special fund should be created to meet such payments." It was noted, however, that a number of states do have second injury funds.

The experience of one company in hiring physically handicapped workers in a state without a second injury fund was cited. It had hired a man who had only one eye with only partial use of it. The man had worked safely for two years on a bench job but suffered an injury to his eye within a few months after promotion, at his own initiative, to the operation of a rather complex machine. His injury was not considered serious; his sight returned within a short time to about the extent it had been before the injury. However, "the company was forced to pay for the total loss of both eyes, total blindness. The company is paying and will continue to pay during the rest of that man's life," the panel member reported.

Changes in compensation for chronically ill persons were also proposed. The need for such changes is exemplified by the experience of a company which refuses to employ a man with quiescent tuberculosis in one of its chemical plants. Over a period of years, this company has found that, if an arrested case of tuberculosis becomes activated, in many states compensation must be paid amounting to as much as $20,000 or $25,000. Another example was drawn from workers with heart disease. In some instances, "if a man with heart disease drops dead . . . . at the plant, we have to pay for it. Those are unfair cases, because, after all, most people who die of heart disease or heart failure expire between the hours of 2:00 and 4:00 o'clock A.M., when they are perfectly quiescent in bed."

A veteran with a service-connected disability, receiving a 10% disability pension for a back injury received in the service, was mentioned by a panel member. After his employment in the plant, the veteran injured his back, and, a few weeks later, the doctors agreed his disability should be considered 12%. The company's contention that it was liable for the difference was denied. Therefore, the company pays the full 12% disability, in addition to the 10% paid by the government.

Union Seniority

CONCESSIONS to physically handicapped during "bumping" was also discussed. An example of a physically handicapped man on a machine and "doing a very good job" was given. As one panel member stated: "There is a layoff in the plant, and the younger employees must be laid off. A person with longer seniority than the physically handicapped will bump this man off the machine . . . Maybe that is just. There are some of us who believe that it is no more than reasonable that a certain concession should be made and that maybe a majority of the union members would be willing to make a concession."

From Monthly Labor Review, October, 1954.

1. Information from transcript of the August 26, 1954, panel session on The Safety Factor and Employment of the Physically Handicapped at the fall meeting of the President's Committee on Employment of the Physically Handicapped. Panel members were STANWOOD L. HANSON (moderator), Assistant Vice-President, Liberty Mutual Insurance Company, Boston; DR. G. H. GEHRMANN, Medical Director, E. I. du Pont de Nemours Company, Wilmington, Delaware; HARRY H. VERDIER, Assistant Manager, Philadelphia Safety Council, Philadelphia; FRED MARBLE, Assistant Superintendent of Production, Electronics Division, Bendix Aviation Corporation, Kansas City, Missouri; and JOHN R. KUMPEL, Special Representative, Safety Workmen's Compensation, United Rubber, Cork, Linoleum, and Plastic Workers of America (CIO).

Unions working with a cooperative management can accomplish much, however. To illustrate, the CIO Rubber Workers have incorporated into many of their contracts the following type of provision: "when a man is injured on a job and is unable to perform that job any longer, he will be given another job, in line with his seniority, that he can do competently." The union and the companies have found that these handicapped are "real assets. They do their jobs conscientiously and they become generally the most safety-minded men in the plant."

A Matter of Principle

FOLLOWING is the text of a letter, dated November 15, 1954, addressed to the Secretary-General by FRANK A. CALDERONE, M.D., Medical Director of the United Nations Health Service:

"Dear Mr. Secretary-General,

"In a few weeks, it will be four years since I accepted the responsibilities of Director of the United Nations Health Service. During these years, I have had the great privilege of planning and directing the development of the Health Service. It has now been brought to a high level of efficiency and is recognized as an outstanding example of occupational health services in the United States.

"For some time, your office and groups designated by you have been studying plans for the reorganization of the Secretariat, including the reorganization of the Health Service. Of course I have made myself available at all times to assist in these studies and have submitted comments and suggestions respecting the proposed reorganization of the Health Service. You are familiar with my views in this regard. I do not believe there is advantage to the United Nations or myself in my continuing in my present position in view of our differing philosophies regarding the best health practice and policies for an organization such as the United Nations. In particular, as you know, it is my belief that the Health Service should be organized more in harmony with industrial health units and should participate in positive management policies concerning personnel. I have also been given administrative responsibilities relating to health and medical matters concerning the staff of the Secretariat. As you know, I have sought at all times to discharge these responsibilities in accordance with the policies and directives given to me by my superiors in the United Nations.

"I feel that in bringing the United Nations Health Service to its present state of efficiency and standing, I have accomplished the fundamental mission given to me when I took the post four years ago. It is therefore reasonable and appropriate for me at this time to undertake other tasks and responsibilities to which I can effectively apply my experience and knowledge in the fields of public health and administration. Accordingly, I am submitting my resignation as Director of the United Nations Health Service to take effect with the coming of the new year.

"Respectfully yours,

—FRANK CALDERONE, M.D., Medical Director."

THE REPLY of the Secretary-General to DR. CALDERONE, also dated November 15, 1954, is as follows:

"Dear Dr. Calderone,

"I have to refer to your letter and to our discussions concerning our respective points of view on the question of the nature and management of the United Nations Health Service. As is a matter of record in the files you have sent me and as you have read in the report submitted to me by Drs. Line and Engel, the organization of our clinic under your direction has been most favorably commented upon and has earned the praise of many prominent visiting experts in the public health field both from the United States and from other countries, culminating in the award in New York last year of the Certificate of achievement granted by the Occupational Health Institute of the Industrial Medical Association.

"It is to be regretted, therefore, as you point out in submitting your resignation, which I must in the circumstances equally regretfully accept, that there lie between us differing philosophies as to how the over-all needs of the Health Service should best be met from a policy standpoint. I appreciate fully the wish that you have expressed that you should be released from your duties as Director as early as possible but in any event not later than the end of the year, and, of course, I will acquiesce in your wishes and make alternative arrangements. The beginning of January would be the earliest date that I would see to be possible and I am making my arrangements accordingly. At the same time, I hope that you would find it possible to devote the time necessary to continue to serve on those U. N. Boards on which you sit in an advisory capacity until the end of the year, and I would be most grateful if you could so agree.

"Yours sincerely,

—DAG HAMMARSKJOLD, Secretary-General."

People

THE BIGGEST problem in industry is that it is full of human beings. You will learn to your sorrow that while a drill press never sulks and a drop hammer never gets jealous of other drop hammers, the same cannot be said for people. You will learn that a turret lathe may run one part for 10 years without affecting its ability or its willingness to be switched at any time to another part. But men are not that way. You will learn that you have with people the same general problems of preventive maintenance, premature obsolescence, or complete operational failure that you have with machines. You will discover that problems change rapidly, techniques change rapidly, products are transformed in a period of months; but, unfortunately, people change slowly if at all. And you cannot rearrange or retool the human organization of your business with the same ease and frequency as you rearrange or retool the plant.

—JOHN L. MCCAFFREY, President, International Harvester Company, quoted in *Esquire*, September, 1954.

Industrial Medical Association

President's Page

IT IS GRAND to be home again. Fourteen weeks of traveling from Gibraltar to Capetown through 15 countries by car, train, airplane and boat, a distance of 17,000 miles, is a privilege I shall long remember. Interested as we all are in medicine, it has occurred to me that some of the impressions I gained in respect to world medicine as applied to the medical needs of industry would be pertinent.

In Rome I attended the first management-medical meeting of its kind ever held. There were 49 participants who represented 16 different countries. In discussing Management-Medical Director relationships, the Medical Directors had this to say:

"The well-qualified physician can work with *anyone* but not for *everyone*. The requisite for success in any constructive health maintenance endeavor is that the director or member of management to whom the doctor reports be himself fully cognizant and appreciative of his own limitations relative to his own personal health and environmental affairs. If such an individual refuses to assess his own situation in a constructive manner in his own best interests, he cannot possibly be considered a suitable person to direct medical affairs. He is apt, by ignorance, to accuse the doctor of divulging confidences in his behalf which have prevented him from stepping higher up the ladder."

IN NAPLES at the XI International Congress of Industrial Medicine, the preview of an educational film entitled "Medical Service in Industry" was held. At the closing session of the Permanent International Committee, the President of the Standard Oil Company (New Jersey) was tendered a citation for having arranged for the film to be publically shown for the first time in Naples and for permitting so many doctors of the company to attend the International Congress.

From Naples I journeyed southward via Cairo to Nairobi, Kenya. Here it was refreshing to discuss with Dr. D. G. T. Hicks the health of the workers in his area. Dr. Hicks, a graduate of Oxford, is well versed in the significance of environmental factors in relation to health and disease.

IN JOHANNESBURG, of paramount interest was the research center, so capably administered by the eminent Dr. E. H. Cluver, who was most gracious in outlining the broad scope of his activities, particularly in regard to the relationship of government and private enterprise financing the Institute's undertakings. Money is received and the Institute performs the research in keeping with the principles set forth by the staff. Some 200 projects are under way from the study of nutrition to the study of infantile paralysis. Of particular interest to me was the work that was being done in silicosis and asbestosis. The high incidence of pulmonary cancer associated with asbestosis made quite an impression.

THE GOLD fields of the Orange Free State were a memorable sight. A city of 25,000 inhabitants had appeared almost overnight. Here, some 100,000 laborers are screened annually for tuberculosis and silicosis. They work on a contract basis for a period of months and are then returned to their homes and families. These may be as far north as Rhodesia. The various companies involved in the mining activities have built a pretentious hospital to take care of the surgical necessities of these workers.

The African Medical School in Pretoria, adjacent as it is to a large municipal hospital, has unlimited clinical material for teaching purposes. The school is new and small, and, I would say, has great promise for the future.

IN DURBAN, a different type of medical school has just come into being. It is unfortunate that Dr. James McCord* is not alive to see his dream come true—a medical school primarily for the education of the Bantu. I was privileged to meet Dr. Alan B. Taylor, an associate of Dr. McCord for many years, who is now Superintendent of the McCord Zulu Hospital in Durban. He was Acting Dean of the Durban Medical School during 1950-51, the period of its inception. The medical building is now an imposing one, located in close proximity to a native hospital with 2,000 patients. The Durban Medical School is unique

*"My Patients Were Zulus," by DR. JAMES B. MCCORD with JOHN SCOTT DOUGLAS.

in that it is the first medical school established for Africans or Negroes.

I would be remiss not to mention the new oil refinery in Durban which, in reality, was the primary reason for a visit to that part of South Africa. Shortly after the refinery was built according to the very latest scientific specifications, an air pollution—more correctly called "fume annoyance"—problem arose. Residents in the neighborhood complained of the smell. As a result, the industrial hygiene engineers, management, and other essential technical experts got their heads together. Today the odors emanating from the refinery area are conspicuous by their absence. I mention this to illustrate what can be done when all interested parties cooperate to solve a problem.

MY STAY in Capetown, the garden spot of South Africa, was curtailed somewhat by a slight medical setback. However, I shall never forget Table Mountain and the junction of the Indian and Atlantic Oceans. I never dreamed that one could get so far away from home. Perhaps the highlight of my short stay there was a visit to the medical school. There are four in South Africa, and I wished to visit them all. Here, quite by chance, I met Dr. J. E. Thomson, now Professor of Pathology. Twenty-one years ago, Thomson and I worked together at the University of Leeds where I first saw the light insofar as preventive health maintenance was concerned. It was a happy reunion.

Journeying up the west coast, homeward bound, I was the guest of the Firestone Rubber Company in Liberia. This all-Negro republic offers the doctor in tropical medicine every challenge that can possibly be conceived. Malaria, unless controlled, would become rampant. Schistosomiasis is a constant threat. In the plantation confines, one finds native villages well sanitated, and healthy youngsters play in the streets. An emergency hospital, headed by Dr. H. Lyon and a staff of European and American doctors, takes care of the hospital needs of the many thousand Liberians employed. This staff works in close association with the Liberian Institute which is located just beyond the confines of the plantation proper. The buildings for research purposes are the best I have ever seen. Every facility is available, and clinical material is abundant. No doctor with a yen for basic, yet practical, research in the many still uncharted areas in medicine as applied to tropical environment, could possibly find a better place to "think and do" to his heart's content. Dr. MaxMiller, who is the present Director, is a man of broad interests and insatiable enthusiasm. All who are interested in any way with "health" as applied to tropical environments, if they knew the facts, would, I believe, support his efforts financially.

AS A FITTING ending for an interesting and enlightening journey through a part of the world where untold wealth and unlimited expansion await man's control and better understanding of the environmental needs of man, Dr. Colenso-Jones, Medical Director of the Iraq Petroleum Company, gathered a number of his professional associates together. Among them was none other than Professor M. J. Stewart, retired former Dean and Professor of Pathology at the University of Leeds. It was he for whom Dr. Thomson and I worked in 1933. It was he who awakened in me a desire to study man in relationship to his total living environment. For this, I am truly grateful. For Professor Stewart I have this to say—he is a scholar, teacher, and today a most genial gentleman who has attained perhaps man's highest reward, namely, the art of growing old graciously. In the words of Cicero, this thought has previously been expressed as follows:

"He who fills up every hour of his life with activities within his abilities to perform will insensibly glide into old age without perceiving its arrival, and his powers, instead of being suddenly and prematurely extinguished, will gradually decline by the gentle and natural effect of accumulating years."

Interim American Board of Occupational Medicine

Second Notice

THE Interim American Board of Occupational Medicine is presently negotiating with the American Board of Preventive Medicine relative to the grouping of occupational medicine with other nationally recognized professional specialties in the general field of preventive medicine.

Interested physicians who have not previously indicated their interest are invited to communicate with

DR. CARL M. PETERSON, Secretary,
Interim American Board of Occupational Medicine,
535 North Dearborn Street,
Chicago 10, Illinois.

Inquirers will receive application forms and other essential information as these become available. Full instructions will include regulations governing basic eligibility, admission to certification without examination, examination procedure, fees, and other details.

Prompt response will be appreciated.

Letters

In the Philippines

TO THE EDITOR: I read with interest of the work and aims of the Occupational Health Institute in your August issue of *Industrial Medicine and Surgery*, which prompted me to write you this letter. In our country industrialization along modern lines is only in its infancy, and it was about two years ago that the Filippino Physicians in Industry attended industrial seminars, after which we banded together and organized the Philippine Association of Occupational Medicine. Owing to the increasing number of new chemical and metallurgical industries, local physicians have been hired by these new firms. We are learning by experience, and our government, through its U. S. trained staff, is holding seminars on industrial hygiene once or twice every year. I am Plant Physician for National Power Corporation, Maria Cristina Fertilizer Plant, Iligan City, Philippines, and my present job consists of providing medical service for the employees and their families. Aside from the hazards encountered in the plants we also have to contend with malaria and gastroenteral fevers which in this part of the tropics become also an occupational hazard. Since this is the first chemical plant of its kind in the Philippines, naturally I learned industrial medicine the hard way. Now with the growth of chemical and metallurgical industries going on in our vicinity I am meeting new problems every now and then—problems in occupational medicine and in chemical and physical health hazards which in the history of Philippine industry have never been encountered before. I would appreciate it if I could be informed as to whether the Occupational Health Institute could extend its services to the Philippines and as to whether it could help through scholarships and fellowships, or through travel grants, or on an exchange student basis, or in any capacity, to enable a physician from this country to serve in similar industry in your country just to get the necessary training and experience. If there is any suggestion, recommendation or offer you could give towards a better industrial health program for our country it will be sincerely appreciated. Incidentally, I am also the Recreation Director of the plant, and the September issue of *Industrial Medicine and Surgery* had an article by Dr. Jean Spencer Felton on recreation. Please congratulate Dr. Felton for this enlightening and interesting article. In our jungle area recreation is a must and an asset.

—JAMES L. ECHIVERRI, M.D.

Beryllium: Toxic or Not Toxic?

TO THE EDITOR: The feature article in the July, 1954, issue of *Industrial Medicine and Surgery* confuses me. Utterly! Dr. Joseph Shilen and his coworkers present what is termed an *engineering* study of a beryllium plant. It is possible that as a clinician I do not understand engineers. It is even more obvious that if my interpretation of this article is correct, I do not understand beryllium. I have labored under the impression that there was such a condition as beryllium poisoning and have made a diagnosis of pneumonitis due to beryllium on several occasions. Have I been wrong? Since I cannot qualify as an authority on this subject I have awaited the printed reaction to Dr. Shilen's implications. Except for substantiation given this article in several non-medical publications none has appeared other than that which I assume is a mild protest by Van Ordstrand in the September, 1954, *Archives of Industrial Hygiene and Occupational Medicine*. I would therefore like to have some questions answered.

I am certain that many other men in the field of Occupational Medicine desire clarification since they, too, are equally confounded.

I believe that Dr. Shilen wants it to be understood that the plant under study carried out processes which involved the handling of all forms of beryllium from the raw crystalline beryl ore, all compounds and alloys to the finished tool. He impresses me with this statement, "the various materials were handled continuously through the years (10 years) and the amounts handled per day ran into tons." His data "represent concentrations that are relatively high." The article takes up many of the "complex processes which are carried on in large-scale production" never hiding or minimizing the fact that an exposure to beryllium in some form exists.

This is the first point of confusion. In the Van Ordstrand article previously mentioned he wrote "the keynote is prevention and we are convinced from our experience in Ohio that the medical problem of beryllium is now being prevented." But Dr. Shilen never mentions prevention. We can assume that the workers were not thrown into an atmosphere equal to an animal dusting experiment but beyond that we can assume nothing. Just why an engineering report by engineers omitted all reference to even minimal principles of industrial hygiene is not only puzzling but lamentable. It implies that beryllium can be handled with abandon.

As I continue to ponder this study by Shilen and his co-workers I get the feeling it intends to indicate that beryllium is of low toxicity, as the following references show or are so construed. We find these terms, "unestablished toxicity"; "assumed beryllium toxicity." The statement that "to assume beryllium as toxic from the beginning was regarded as the most prudent policy to follow until its *real* status on the toxicological scale has been proved," infers that the initial assumption by him(?) or by others(?) is in error. In this regard I shall return to the opinion of others subsequently.

After presenting a number of Tables purportedly documenting their findings, Shilen *et al* evidenced further disbelief that beryllium is considerably toxic by the following quoted paragraph:

"It has been shown in Tables I to VI inclusive that beryllium becomes air-borne and therefore presumably is respirable. In order to prove this important point, several employees who had worked for a number of years with beryllium exposures submitted urine for analysis. Table VIII shows the quantity of beryllium in micrograms per liter of urine. A review of the results as shown in Table VIII leaves nothing to presume in regard to exposure to beryllium in various departments at the plant. It shows that, without exception, beryllium has been taken into the body and subjected to physiological processes ultimately to be excreted, at least partly, in the urine. It also demonstrates that, *if beryllium were a highly toxic substance*, then these individuals should manifest, to some degree, the symptoms attributable to beryllium."

Nowhere in the article under questioning are there any attempts to state flatly that beryllium is not toxic at all or if so, how toxic. But there is an intimation found in the summary:

"It should be pointed out that this plant is much like any other plant in the metal industry. It has its

routine absenteeism and its individual problems, but there is nothing indicated in the entire study to lead to the conclusion that this plant presents more hazardous working conditions *than any other plant in the metal industry*. The usual hazards of exposure to pickling, dust, grinding, and the like are present as they are in other plants but there is nothing to indicate that special types of control are necessary. Cuts healed cleanly with no granulomatosis. It is believed that the processing of beryllium can be done with the same degree of protection as that used in processing any other metal."

Is the reader of Dr. Shilen's article, the general practitioner or the industrial physician in the small plants of this country, to believe that the processing and handling of beryllium in all its various forms is no more hazardous than the handling of zinc, aluminum, copper, iron or steel? Is it meant that the "same degree of protection" for the aluminum worker is sufficient for the lead worker? Is the "same degree of protection" for the cement worker good enough for the worker in free silica? The term "same degree of protection" implies casual protection which I did not think industrial engineers tolerated. If so then our MAC regulations might well be casually observed.

I now return to the point in the Shilen article which implied that the original assumption that beryllium is more than mildly toxic is in error to ask these questions. How should one look upon his own experience in regard to his previously diagnosed cases of beryllium pathology? Or the death certificates? Or the compensation awards? If wrong, I, for one, feel taken-in. Have I been taken-in by such observers or investigators as Gardner, Shipman, Bowdich, Hardy, Machle, Sander, Sterner, Van Ordstrand, and others? Did they reach their conclusions quickly and without sufficient consideration as to cause and effect evidence? Were the so-called Massachusetts, Connecticut, Ohio, and atomic energy cases not due to beryllium? Were the biostatistics in these instances unreliable?

The answers would seem overwhelmingly against the conclusions reached by Dr. Shilen. Yet one nonmedical journal followed his report with an article entitled "No Danger in Beryllium." Hence the pot boils. If the exposure to beryllium were confined only to one or two industries the problem could be left with them for solution. But the use of beryllium extends to many industries, large and small. To ignore the truth or error of the Shilen study would be to disregard the many physicians who must rely upon documented and substantiated opinions.

The questions I have asked must be answered with authority. It has been eight years since there has been held an adequate gathering of the minds. The situation demands an open debate, well planned, with all pro and con persons participating. This is a challenge to the Council on Industrial Health, the Industrial Medical Association, and the American Academy of Occupational Medicine. Any one of these three groups could well remove from their planned programs one or more trite subjects to make room for a consideration of beryllium, toxic or non-toxic. Let's have at it. (Italics mine.)

—RUTHERFORD T. JOHNSTONE, M.D.

On Rheumatoid Arthritis

TO THE EDITOR: Our attention has been drawn to certain misquotations and misconstructions of our publications by Dr. Schepers in a letter dealing with "The Rheumatoid Lung" published in the August, 1954, issue of your Journal, which clearly indicate that he has not read them carefully.

The impression is given by Dr. Schepers that we claim to have discovered a new "specific industrial disease" and that we have been "so unwise as to inspire them (South Wales miners) with the thought that the joint trouble may be due to dust." In none of our publications have such claims been made. We do not believe and we have never stated in our publications that rheumatoid arthritis in coal miners is due to dust inhalation. We stated that on the evidence then available (1953) it was impossible to state whether (a) progressive massive fibrosis predisposes to rheumatoid arthritis; (b) rheumatoid arthritis predisposes to progressive massive fibrosis; or (c) there is a factor which is causally related to both the arthritis and the massive fibrosis. Evidence is now available that the incidence of rheumatoid arthritis is no higher in the miner in South Wales than in the non-miner, though miners with rheumatoid arthritis have a very high incidence of massive fibrosis, suggesting that it is probably the third of these possibilities which is correct.

There are certain other inaccuracies which need correction. Caplan (1953) found 51 cases of rheumatoid arthritis among 14,000 coal miners *who had applied for disablement benefit* and characteristic "rheumatoid" lesions were found in 25% (not 90%) of these cases. The radiological appearances of these lesions have been described in detail and we consider them to be sufficiently characteristic to be easily recognized by clinicians and radiologists familiar with these appearances.

Dr. Schepers has presumably not met competent radiologists "who would venture to classify one of these x-rays as rheumatic in type without knowing that the patient has rheumatic disease," because the condition was unknown to them. The fact that it is possible to select the "rheumatoid" type of lesion from a group of chest x-rays showing massive fibrosis, without prior knowledge of the clinical condition, was shown in one of our papers. Dr. Schepers arrives at the conclusion that "there is nothing pathognomonic about the radiological appearances." If the opportunity ever arises for him to examine our x-rays, we feel sure that he will "be proved wrong about this."

Dr. Schepers criticises our logic and accuses us of adapting our facts to theory in the type of case in which the "rheumatoid" lung lesions precede the arthritis. It is a fact that occasionally the round opacities in the chest radiogram have preceded the onset of arthritis. We are, therefore, suspect of a miner who shows what we consider to be characteristic "rheumatoid" lesions in his chest radiogram and we are not surprised when he develops arthritis at a later period. In this respect it is interesting to note that Miall has recently found that in miners with "rheumatoid" chest x-ray lesions but without arthritis there is a high familial incidence of rheumatoid arthritis. The incidence is comparable with that found in miners suffering from rheumatoid arthritis and appreciably higher than in non-arthritics without "rheumatoid" lung lesions.

Dr. Schepers suggests many differential diagnoses which should have been excluded. Most of them were, but we may have failed to make this sufficiently clear. Thirty-two of the cases seen in South Wales have now undergone extensive clinical investigations to exclude allied conditions. All the cases satisfied strict clinical, radiological or serolo-

gical diagnostic criteria of rheumatoid arthritis.

We find it difficult to follow Dr. Schepers' line of thought throughout his letter. He begins by admitting that he has seen and is familiar with the "rheumatoid" lung lesion in coal miners; he then casts doubt on the existence of this condition as a clinical entity but ends by theorizing as to the causation of the lung lesions. We agree with Dr. Schepers that multiple factors are probably concerned in the etiology of the lung lesions in the "rheumatoid" syndrome (*not* "new disease entity"). We postulate an abnormal tissue response to dust and the tubercle bacillus in miners with a so-called rheumatoid diathesis. Therefore, far from "ruling out definitely the potential common denominator, the human tubercle bacillus in all its different biological phases," we believe and have stated in our publications that the "rheumatoid" lung lesion is probably a form of modified tuberculosis.

We have been more fortunate than Dr. Schepers with autopsy material and it is hoped that a report on the pathological findings will be forthcoming.

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Books

Medicolegal

PAPERS DELIVERED BEFORE THE SOCIETY OF MEDICAL JURISPRUDENCE, 1942-1950: GUSTAVE J. NOBACK, PH.D., Editor. Society of Medical Jurisprudence, 1200 Fifth Avenue, New York 29, 1954, pp. 279.

This book, in a format in keeping with older ones in the series and thus more elegant than modern, is the published record of the outstanding addresses before this Society's assemblies during the years 1942-1950. Those of the medical profession who engage in forensic medicine are engaged in scientific activities with a wider life span than any other form of medicine. Activity may begin long before an individual's birth, as in the determination of paternity, and long after death the activities may go on, such as in relation to the individual's heirs. The very term "medical jurisprudence" is confusing to most physicians—all of which is made clear in a simple definition, quoting Mr. Justice Cardozo: "Medical jurisprudence is the correlation of medical knowledge to the purpose of the law." That is clarity beyond further need in exposition.

This Journal in selecting books for review long has adhered to the requirement that every reviewed item must present some bearing on industrial medicine. Scrutiny for that content no longer is a burden since in this day practically no medical book is without implications as to occupational health. So it is in this publication since at least one-third of this book's content relates to industrial medicine as reflected in these titles: "Total Disability from Diseases of the Heart"; "Practical Problems Concerning Poisoning by Lead and Other Industrial Products"; "Medical-Legal Problems Relating to Eye Injuries"; "A Malpractice Prevention Program"; and "The Measurement of Permanent Disabilities." Dr. Paul Reznikoff in his address introduced a truism that ever should be in the mind of the industrial physician. "We are limited in our information as a rule in an individual (medicolegal) case because when we treat patients we do not constantly think what is going to be the industrial or the legal, or the economic aspects of his daily work." Not so thinking contributes to the difficulties of medicolegal situations and thus paves the way for the services of the learned group that constitutes the Society of Medical Jurisprudence.

Things Maritime

OF WHALES AND MEN: R. B. ROBERTSON. Alfred A. Knopf, New York, 1954, pp. 300, $4.50.

DOCTOR AT SEA: RICHARD GORDON. Harcourt, Brace and Company, New York, 1954, pp. 191.

It is unlikely that the publisher of either of these "Doctors Asea" ever anticipated the possibility that a review would appear in a medical periodical far removed from ships and whales. No less, there is reason aplenty for such reviews. A review becomes fitting for any book that describes employment of groups of men in an industry heretofore little known within that long listing of some 28,000 ways in which men go about gaining a livelihood. The doctor serving those aboard a ship is an industrial physician and his ship is his industrial plant. And so, these reviews.

OF THE two, "Doctor at Sea" is, as to sheer reading amusement, the better book. It is a seamy book, of whores, brawls, and drunks. This is the record of seamanship at its worst, of ship medicine at its lowest. Permit the ship surgeon to furnish the proof:

"The doctor was by order of the Ministry of Transport, the uncompromising power who prescribes on every item of a sailor's life from the number of lifeboats to be available in emergency to the number of times he shall have eggs for his breakfast. Ninety-eight souls can sail the seas until they are carried away with obscure nautical illnesses, like the shipmates of the Ancient Mariner: their health is preserved with a bottle of black draught, the 'Ship Captain's Medical Guide,' and a scalpel also used for sharpening the chartroom pencil. The Second Mate or the Chief Steward holds the keys of the drug chest and practices daily, after breakfast. All pains below the umbilicus are treated with strong purgative, all disturbances above with Ministry cough mixture, and lesions on the remainder of the body with turpentine liniment. Obviously there occur from time to time more alarming complaints, and these are submitted to surgery under wireless instructions by the Captain on the saloon table, after the patient and the surgeon have taken sufficient brandy to instill in each other confidence that both will survive the operation.

"But one more soul on board brings to all the benefits of medical science—or as much of it as the doctor can remember, because ship surgeons are notoriously forgetful of these things. The sea induces an attitude of pleasant detachment toward problems that strain thought ashore, including those of the diagnosis and progress of disease, and the doctor has few professional obligations to distract him from his pastimes or enrich him with experience. For these reasons the companies naturally dislike the expense of carrying him—but then, the Fathom Steamship Company would have objected to the expense of lifeboats."

Having enjoyed this book, and it is enjoyable, the conclusion is that no physician in his right mind would go to sea as a ship surgeon; for that matter, no person would go to sea in such a ship. This book contributes nothing to industrial medicine except to serve as a horrible example of what not to do.

"Of whales and men" is another kind of book: a sound contribution to literature, a faithful description of the industry of modern whaling, a challenge to the quality of Moby Dick, and a searching inquiry into the minds and behavior of that type of man who elects to go to remote seas for long periods under conditions of the most captured free work force known to industry. The closest comparison is to barred-in prison labor, and that represents no free choice of employment. To study geriatrics or gerontology one vantage point is the liner on a world cruise. But, to study the nearly psychopathic mind a whaler ship is a preferred locus. So the psychiatrist, for such was and is the author, took to the Antarctic Seas for eight months and kept his eyes and mind wide open for 48,000 miles.

Snatches from some books serve as suitable peepholes to the whole. In this book, everything is quotable and no few snatches reveal the whole: "Even the senior medical officer, who, next to the chief engineer, is reckoned by the average unappreciative whaleman to have the softest job on the expedition, was very busy for the week or so after our expedition left Georgia. Although he spent as much time as he could bird-watching, he spent rather more time during that period in the sick bay. For an epidemic of 'influenza,' as we called it, had broken out on our ships, and the men were going down like the traditional flies, with three-day fevers, coughs, and occasionally a threatened pneumonia. I had been forewarned by predecessors in my job of this peculiar outbreak, which attacks nearly every whaling expedition leaving South Georgia. It had scared the wits out of many a whaling doctor in the old days of Dover's Powders, and had killed many a whaleman and explorer who had left the island (including the toughest of them—Shackleton), but in these days of penicillin and various -mycins, it was a troublesome but not frightening outbreak. It would take an epidemiologist to explain properly the South Georgia 'flu' that was affecting us all at this time. I can only say vaguely that it seems to be connected with the fact that the resistance to all respiratory infections among the island inhabitants drops sharply during the winter, when they are cut off from all the coughs and sneezes of the rest of the world. The whaling ships bring the bugs back to the ill-prepared islanders in the southern spring, and the whole immunity-starved island is knocked flat by germs that have been brow-beaten and rendered harmless in the crowded northern hemisphere. Then, by what the bacteriologists call 'serial passage' through a succession of highly susceptible subjects, the germs resume their virulence—get back their self-confidence, as it were, in their malevolent attack on the human race—and, by the time the whaleships leave the island, are malignant enough to make another assault on the men who brought them to the island. So even I was busy as we headed south."

"I should like to be able to say that I dashed straight off on the catchers to see the first of the whales being killed, but it was not so. The first few hundred whales I saw were dead ones, for I was tied to the factory ship at the beginning of the season, and, as soon as I planned a catcher trip, some ignorant Whaler Group VIII would thrust his foot into a piece of machinery where no man had ever thrust a foot before, and it would take all night to extricate him and a week to get his foot looking like a foot again. Or the manager would inconsiderately go down with the South Georgia flu when I had just told him the expedition was clear of infection; or old Alec MacDougall, the boilermaker, would come along apologetically just as I was about to go off on one of the catchers, with yet another non-magnetic brass splinter embedded deeply in his eye, and it would be several days before we could assure him that his sight would be all right."

"The length of the whale is that of a railroad car, and its height and girth are about the same. An elephant could walk under its up-ended jawbone without touching at any point. Its fins are the size and weight of a pretty large dining-table, and its flukes would make an excellent pair of wings for a fighter aircraft. (They are also perfectly streamlined, and, as I am sure their toughness and durability exceed that of Duralumin, I commend them to aircraft designers.) Its blubber, Mansell estimates, would keep all the votive candles burning in St. Peter's, Rome, for a century or more; and its meat would supply a hamburger (and a good one, too!) to every person in Boston, Mass. Its tongue would overload a fair-sized truck, and it would take six very strong men to lift its heart. Its skull is the size and weight of a motor car, but the brain contained therein is not much bigger than the carburetor. Its blood would fill seven thousand milk bottles, and, if we wish to go into physiological astronomy, it contains by my reckoning some eight million million red blood corpuscles. A fairly large monster! (Its value, for those who are interested in such things, is today about six thousand dollars.)

"The date, time, and position of every whale taken had to be reported. The length of every whale was accurately measured. The sex was noted, and, in the case of females, whether pregnant, and, if so, the size and sex of the foetus and whether the cow whale was producing milk. The point of all this I could understand, and also why in these days of expensive hormones the biochemists should be interested in the collection of internally secreting glands of great size, such as the whale's pancreas and pituitaries. 'But why, in the name of God,' I asked Adamson, 'do you make a collection of ovaries? I've noticed that you have hundreds of them all neatly pickled and stowed in barrels up forrard there.'

"He chuckled. 'There's a man you haven't met yet,' he told me, 'but he'll be waiting for the ship when we get into Liverpool. He comes south with us every few years, and he's a damned nuisance, holding up production to make his researches when we have him aboard. We call him Ovary Joe, and we all get along well with him, though as a matter of fact he's a very distinguished London biologist. But he's got a bee in his bonnet that you can tell the age of a female whale by examining the number of ruptured follicles in the ovaries. Well, Joe gives me threepence for every pair of ovaries I bring back to him the year's he's not with us, so I collect and pickle them from every whale—perhaps mainly because a few thousand three-pences is quite a lot of money, but also because Joe is a good chap, though his ideas are maybe cuckoo.'"

"I have labeled the whalemen psychopaths, but by that I mean nothing derogatory. I do not mean that they were mentally unbalanced or sick, nor do I mean that they suffered from any defect or neurosis or

psychological inferiority. Often laymen who do not understand the term, and even psychiatrists who do not understand the type, use the word psychopath to mean these things. But I use it rather as a term of superiority. The psychopath—the 'man with the suffering mind,' to analyze the word etymologically—is a type I have spent my life studying, and my conclusion long ago was that his mind is healthy—too healthy to be acceptable to, or to accept, the civilization into which he was born, and therefore doomed to alienate itself from that civilization in some way.

"Their psychopathic traits showed up to greatest advantage, not when they were hunting or dismembering the whale—for then they were merciless automatons—but during their few periods of relaxation in the Polar wastes. For occasional official holidays are celebrated by these men during their seasonal grind to bring the maximum amount of food possible out of the Antarctic to the citizens in the north, and on the rare occasions when they lay off whaling to relax I think the citizens they feed would wish no part of them, and would be horrified by their manner of relaxing." If you want any more, read the book. Read both books.

Body Types

ATLAS OF MEN: WILLIAM H. SHELDON. Harper & Brothers, New York, 1954, pp. 357, $10.00.

This handsome volume is tantalizingly close to one of the functions of the industrial physician. He it is who is called upon to conduct or supervise physical examinations of applicants leading to suitable placement of those employed. The industrial physician knows that body form and structure well relate to work capabilities involving physical effort. However, more often than not, job placement is predicated upon disease and physical defects rather than body form. The applicant found to be color-blind certainly would not be assigned to duties in the color matching department. The known epileptic would not be employed as a greaser of machinery. Still, body conformation is given some consideration. The youth of elephantine proportions will not make a good messenger. The applicant with fragile feminine structure would not be employed as a hammerman in the drop-forge section. This book elaborates far beyond these simplicities, but it was not written for the industrial physicians, nor primarily with an eye to job placement. The author created for his use a "Somatotyping" machine which provides quantification of the three primary components that determine the morphological structure of an individual. These are endomorphy, mesomorphy, and ectomorphy, all subject to gradation within themselves and to combination within the three. With a system of appraisal not unlike that of the Crocker-Henderson's "Odor Classification," numerical values are assigned to the extent that these three primary components exist. All told, 88 different body types are described based on examination of 46,000 men. The 1 1 7 numerical assignment relates to men of the ant-like structure while at the other end, the 7 4 1 type suggests the whale. In fact, the author whimsically assigns to every classification a term from the naturalist's world indicating some somatic type kinship. Thus, there appear the wasps, the praying mantis, the falcons, the owls, the bears, the walrus, the hippopotami, and the whales. At all times the author is troubled by the absence of "norms." He observes that those much-used tables of age, height, and weight are but average and meaningless. He continues that a shoe salesman might insist that a man of certain height and weight would be expected to wear shoes of a given size, yet, for the individual buying the shoes that average might have nothing to do with his own need for shoes. Here perhaps, for the first time as a general assertion, body form is identified with expectable behavior and activities. For example, the 1 2 6 somatotype, the delicate wasps having enormous skin surface in proportion to the total body mass, probably scorns outdoor swimming, even in tepid water, as a frigid horror, while the 7 4 1 variety, the hippopotami, is thus described: "No giant water hog of old ever loved the shallow shores more dearly than does the human 7 4 1 of today. Watch him at Coney Island, on a hot summer day when the Dodgers are playing away. See him paddle joyously about and float on the water—indeed he can all but sit on it. . . ."

The author is well aware that his assertions as to behavior have little significance except for some possible situation wherein large numbers of all somatic types are subjected to the same environment and governed by the same inheritance. Still, warrant obtains for the conclusion that certain diseases may be expected at higher frequencies among specified bodily types—thus there are body forms given to ulcers, or to nervous disorders. Again one group, characterized in part by massive and powerful lower trunk and legs, are happily adapted to successful academic life and little subject to gastric ulcers.

For industrial medicine in general this book is a new gateway, but, before that gateway is possible for many, there must come about suitable adaptation to the mundane needs of industrial placement of individuals.

Something Wrong

THERE ARE MANY obstacles in the way of the physician in the achievement of his purposes on behalf of his patient. These obstacles are such that many physicians prefer not to be involved in any way in compensation cases, and avoid them whenever they find it possible to do so. The very fact that this is the case should suggest to those who are responsible for these laws and for their administration that there is something wrong in the procedure from the medical viewpoint. It is time in many of our states that these matters be looked into carefully and critically, and that a further and more realistic attempt be made to adapt the legal and administrative procedures to the requirements of a better and more effective medical practice, which will have as its primary goal not compensation for disability, but the rehabilitation of the patient in the swiftest and most complete manner."

—From "Compensation for Residual Disability," by CLARENCE D. SELBY, M.D., quoting ROBERT A. KEMOS, M.D., in Transactions Bulletin No. 27, 18th Annual Meeting Conference, Industrial Hygiene Foundation.

INDUSTRIAL MEDICINE AND SURGERY

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Industrial Medicine and Religious Freedom

RECENTLY Tobey, in the *American Journal of Public Health* (October, 1954), has written knowingly about "Public Health and Religious Freedom." He observes that freedom of belief may be absolute but freedom of action is not. "The adherents of certain religious sects teach and believe that disease is unreal, that it arises from error and evil, and that when maladies occur, as they do, they can be healed by divine intercession operating through faith and prayer. The true scientist may disagree with such doctrines, but their followers have a legal right to their beliefs. They do not, however, have any right to endanger others, or the entire community, by the practice of these beliefs.

"Members of religious sects who espouse faith healing in one form or another do not accept, and often actively oppose, established and reasonable public health procedures, such as vaccination and immunization, physical examinations, use of x-rays and laboratory methods, blood tests, quarantine, pasteurization, chlorination and fluoridation of water supplies, and the various medical, surgical, hospital, nursing, dental, nutritional, and sanitary engineering procedures which are essential in certain situations. This opposition has given rise to considerable litigation in this country, the results of which have served only to strengthen public health administration."

The essence of this full-length publication is that, though highly numerous efforts have been made in the courts to establish freedom of action in the furtherance of freedom of religious belief, no final legal decision ever has upheld religious tenets to the point of jeopardizing the health of others within the community.

With this publication in mind it becomes pertinent to inquire whether religious beliefs substantially interfere with proper activities in the conduct of industrial medicine. At once it is to be recorded that religious beliefs interfere perhaps even less than is true for the community as a whole. An applicant for employment might entertain objections to a preplacement physical examination on the grounds that such examination increases the awareness of the examinee as to the possibilities of disease. Such an attitude may constitute a detriment in community health but in the case of industry the applicant usually does not obtain employment.

In the presence of wounds, such as lacerations or fractures, rarely do religious beliefs go so far as to handicap appropriate treatment. In less obvious conditions, such as occupational diseases, and, for example, occupational dermatitis, the patient may refuse all treatment, preferring self-medication, spiritual or cultic ministration. Such individuals promptly jeopardize all right to compensation and many state laws so provide. On occasion the administration of these laws may be such that a prejudiced award may be made. In the instance of some self-insurers, the policy is to make payment for such period of non-work as may be deemed necessary in the presence of adequate treatment and to contest all further payments. In the case of freely communicable disease such as smallpox in an industrial worker, the problem becomes not one for the industrial physician, since public health officials take over the situation and impose whatever protective measures may be indicated.

The question may arise as to what attitude should be taken in connection with sick benefit insurance under any name. While the charter

or constitution of such organizations clearly may specify certification as to illness by a physician, common practice often leads to the acceptance of a certificate signed by any "licensed" practitioner of medicine.

In the presence of well recognized but not highly dangerous communicable diseases, such as acute respiratory affections, many workers, regardless of religious belief, selfishly prefer to remain at work, thus creating opportunities for the ready dissemination of their viruses or bacteria, and their attitude is that "I don't feel any worse here than I did at home." This attitude in and out of industry perhaps is the greatest single factor in the distribution of the less important respiratory tract diseases. While industrial medicine and management are not always diligent in protecting the work force against the spread of less important communicable diseases, the right to remove recalcitrant workers exists. Some workers, failing to respond to persuasion, duly are removed from the work area for their own protection and in behalf of their work associates.

All considered, it does not appear that religious beliefs in the United States greatly interfere with the proper conduct of industrial medicine. Equally it appears that wholly apart from religious beliefs, ordinary stubborness, passive resistance and unwillingness to cooperate widely militate against the best quality of protection of others against minor communicable diseases, against the best in therapy for minor injuries, and against the best use of safety and other protective measures. Few difficulties in industrial medicine are created by religious beliefs. Far more arise from the major sin of ignorance as to how to procure and serve health—a sin not limited to any religion, creed, race, nationality or economic state.

Iatrogenic Health

"IATROGENIC" is a coined word that started off toward what could have been a happy career, but early fell into bad company and now is far astray. It was put together from *ιατρος* (physician) and *γενικος* (to generate). It means "produced or enhanced by, or attributable to, a physician." From the beginning its association should have been limited to the physician himself and the things he brings with him when he appears where he's needed—the relief of mind, the lift of spirit, the expediting of recovery. So used, it would have preserved instead of repudiating the positive connotations of the physician's presence, the credit that is due him because of his consecration to the business of cure—for it is the physician who produces and enhances the atmosphere of hope.

But unfortunately the new word was not in that manner limited. Instead someone gave it a shove in the opposite direction, coupled it with what the physician finds instead of what he brings, changed the "enhanced" of its definition to "aggravated," and came up with the odious term, "iatrogenic disease"—that combination of rack and wheel and thumbscrew wherewith to torture the medical profession.

Under this inversion of sense, the physician called on to treat one disease is alleged to affect its possessor with another. This added disease is said to be most evident in the realm of the neuroses. It is supposed to result from the patient's reaction to his own imaginative conclusion that the physician is guilty of any of a long list of omissions and commissions.

Among the imagined omissions may be failure to reach a proper diagnosis at early opportunity, or to detect psychosomatic states, or to promote immunization measures, or to give adequate attention to incipient disorders, or to institute commendable rehabilitative procedures. If any "iatrogenic" sequels can be imputed to such omissions, the reason is that, regardless of the fact that the physician is the sole arbiter as to what not to do, it is the patient who is deciding what is "proper," how much is "adequate," what is "commendable." The decision is too much for him.

Among the commissions may be the institution of treatment in the absence of diagnosis, undue dependence upon laboratory tests, unreasonable use of vitamins and antibiotics, overtreatment—notably in connection with skin troubles, or even "listening too long with the stethoscope." Here again any "iatrogenic" effects are because it is the patient, not the physician, who interprets the degree—what is "undue," how much is "unreasonable," how long is "too long."

And here again the patient takes on more than he can handle.

The patient's irrational gamut is endless, and with respect to every nuance of it the physician always is on the spot. If as a matter of judgment suiting the occasion he treats his patient's complaints with buoyant lightheartedness and seemingly minor concern, he may be charged with lack of proper interest in some possible deeply-underlying disease which the patient suspects he has. If otherwise he exercises endless care in the laboratory and in physical examinations, he may be charged with creating anxiety states, the patient imagining that some important disorder is involved. If honestly he appears uncertain as to a diagnosis, he may start a chain of emotional mal-responses. If with finality he makes a diagnosis of a significant disease but without that completeness of scientific proof which, in its own procurement, may lay him open to the charge of over-alarming his patient, he may be assigning that patient to endless distress over non-existent pathology.

Thus it is phobia if he does; phobia if he doesn't; "iatrogenic disease" either way. This can go on to embrace practically everything the physician may do or say, or not do or say. But long before it gets that far it will have reached the point of utter absurdity—the fantastic Alice-in-Wonderland situation where the patient speaks: "Doctor, I sent for you to get me well, but instead you've made me sicker. Where I had only one disease before you came, now I have two—my own and the one you gave me. So instead of paying you for treating the first, I'm going to sue you for causing the second."

This is more than merely a bit of semantic "fun with phobias." It is a not-overdrawn picture of what can happen when so-called "iatrogenic disease" shall have been so much talked about and written about that it is confirmed as a clinical entity. Already it has been mentioned as such in the literature.

In the course of years of ministrations many physicians no doubt have contributed unwittingly to the fears or anxieties of one patient or another. But for every incident of that kind there are the thousands where, as a matter of natural order, all that could be considered "iatrogenic" has been helpful, healing, heartening—in all respects the opposite of disease. In simple fairness to all physicians, and before its indiscriminate use can become a veritable nightmare of distortion, the term "iatrogenic disease" should be put away and forgotten. There are enough real diseases to engage the profession's efforts and abilities without magnifying the occasional imaginings of a few patients into another one—and then going on to compound the phantasy by giving it a name that blames it on the physician.

Instead of blame, let the word give credit. If it must be used let it be coupled with "health." "Iatrogenic health" is a sensible term—an honest term, with meaning. For the sick it has positive connotations. For those who are not sick it may indeed become the scientific textbook synonym for preventive medicine—of which, after all, the general practitioner is probably the most general practitioner.

Dr. Henry Field Smyth, Sr.

DR. HENRY FIELD SMYTH, SR., physician and medical industrial hygienist, died on October 15 at the age of 78 in Pocasset, Massachusetts, where he resided.

The second generation of those engaged in occupational health activities, in looking over their shoulders to the beginnings of industrial medicine in the United States (meaning the first three decades of this century), are given to recognize "The Five Originals," or, as sometimes stated, "The Big Five." It is perhaps fortunate that few listings of "The Big Five" always recognize the same physicians. There were far more than five industrial physicians highly active in that period so that altogether as many as 20 names may have been included in "The Big Five" listings. It is a tribute to the memory of Dr. Henry Field Smyth that he was included on the majority of those rosters.

The early days of occupational health in the United States were far less complex than at the present time. A pleasant simplicity limited activities. There were no large problems of administration, business economics, pension systems, public relations. Foremostly the physicians of the period were privileged to be scientists and directly to engage in many pursuits that nowadays have been taken over by engineering industrial hygienists, industrial health physicists, chemists, and other professional workers. Henry Smyth belonged in that untrammeled group. He worked with his own
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Dr. Smyth contributed in no small measure to the professional organizations within his field. His scientific imprint may be found in the American Medical Association, the American College of Physicians, the American Public Health Association of which he was an officer, the Industrial Medical Association, and other scientific associations. Dr. Smyth's days on earth have passed but, as long as occupational health persists, and no end is expectable, his contributions will be remembered with personal affection and with scientific respect.

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Pro-Banthine: For Anticholinergic Action in the Gastrointestinal Tract

Combined neuro-effector and ganglion inhibiting action of Pro-Banthine consistently controls gastrointestinal hypermotility and spasm and the attendant symptoms.

Pro-Banthine is an improved anticholinergic compound. Its unique pharmacologic properties are a decided advance in the control of the

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Roback and Beal[2] found that Pro-Banthine orally was an "inhibitor of spontaneous and histamine-stimulated gastric secretion" which "resulted in marked and prolonged inhibition of the motility of the stomach, jejunum, and colon. . . ."

Therapy with Pro-Banthine is remarkably free from reactions associated with parasympathetic inhibition. Dryness of the mouth and blurred vision are much less common with Pro-Banthine than with other potent anticholinergic agents.

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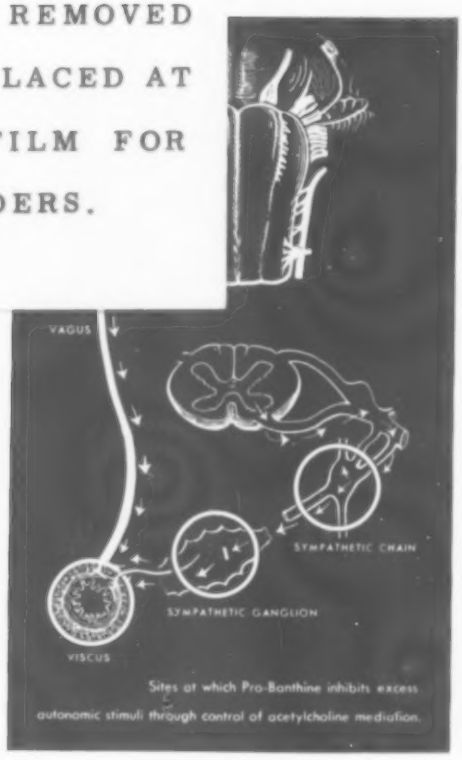
Pro-Banthine (*β*-diisopropylaminoethyl xanthene-9-carboxylate methobromide, brand of propantheline bromide) is available in three dosage forms: sugar-coated tablets of 15 mg.; sugar-coated tablets of 15 mg. of Pro-Banthine with 15 mg. of phenobarbital, for use when anxiety and tension are complicating factors; ampuls of 30 mg., for more rapid effects and in instances when oral medication is impractical or impossible.

For the average patient one tablet of Pro-Banthine (15 mg.) with each meal and two tablets (30 mg.) at bedtime will be adequate. G. D. Searle & Co., Research in the Service of Medicine.



Sites at which Pro-Banthine inhibits excess autonomic stimuli through control of acetylcholine mediation.

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A native of Philadelphia, he graduated in medicine from the University of Pennsylvania in 1897. As was customary for the period, he had two years of study in Europe, his choice being the University of Vienna. After 10 years of private practice, he returned to the University of Pennsylvania for special training in industrial hygiene and this fact marks him as one of the earliest physicians academically trained in his field. In 1914 he became an instructor in industrial hygiene at Pennsylvania and advanced to a professorship. At the time of his death he was Emeritus Professor of Industrial Medicine at the University with which he had so long been identified as student and teacher.

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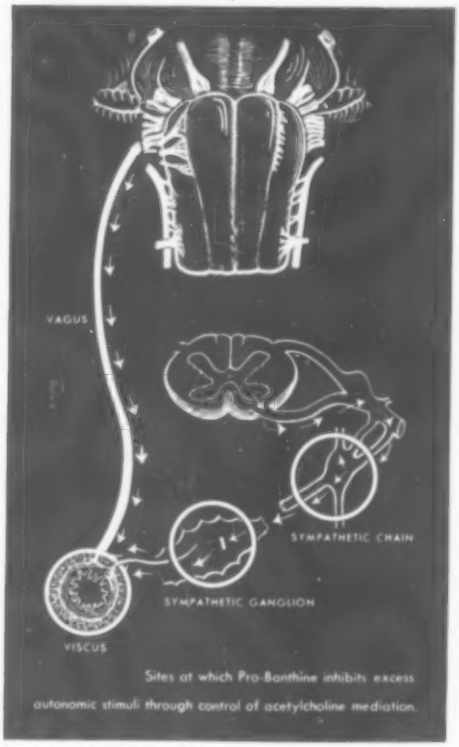

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ANACIN . . . The Anacin Industrial Unit provides 250 cellophane envelopes, each envelope containing two Anacin tablets. This package offers the advantages of cleanliness and convenience for dispensing to individuals. It also assures the proper dosage in every case. Anacin is preferred in so many industrial dispensaries because Anacin gives fast, long-lasting relief from pains of headache, neuritis and neuralgia. When you order Anacin® tablets, order them in this special sanitary industrial unit, 250 envelopes, or 500 tablets, for $2.83.

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BiSoDol Mints . . . For greater convenience, BiSoDol is also packaged as mint tablets, 500 to the bottle. BiSoDol Mints are so palatable that they may be taken without water, if desired. $1.70 for 500 tablets.

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NEW! SPERTI BIO-DYNE® OINTMENT . . . For the treatment of burns, cuts, abrasions, contains biological substances obtained from yeast and fish liver cells which act in minute quantities directly on injured cells to stimulate their metabolism and proliferation. Minimizes scar formation—promotes rapid healing. Packaged in 15 oz. jars @ $48.00 per dozen. (Minimum shipment—3 jars.) Hospital size—5 lb. jar $15.50 per bottle.

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News, Comment, Opinion

THE WIFE of an overly conscientious medical researcher had twins—and came the happy day at the church for the baptism of the twins—and the parents walked proudly down the aisle to the front of the church where the minister was standing. The researcher husband was carrying the twins—one over each shoulder. The minister approached the young couple—took a step toward the researcher husband and the twins—put his hand in the baptismal water—and just then the father of the twins, being of sound research mind, said to the minister, "Reverend Brown, will you please baptize this one only—I am using the other for a 'control.'"

—From *Detroit Medical News*, November, 15, 1954.

Reasons

RELATIONSHIP between good morale and sickness absenteeism is underlined by new study among some 3,000 New York Telephone Company employees: Men who were out often because of illness tended to be those who preferred some other occupation to the one in which they found themselves, who had unsatisfied driving ambitions, or whose home life was unhappy because of illness in the family or uncongenial mates. Women in the frequently absent group were those who would have preferred to be housewives; those who were almost always on the job were single women who found their positions quite satisfying.

—*Industrial Relations News*, 4:35 (October 23), 1954.

Foot Injuries

OLD and worn shoes are causing foot injuries to factory workers in England, the *London Daily Express* says. Sir George Barnett, Chief Inspector of Factories, in a recent annual report said that 19,000 workers had been hurt needlessly in one year because of inappropriate footwear. Of 28,000 factory accidents in 1952, almost one in six involved foot injuries. Two of every three such accidents could have been prevented by stout safety boots. Flimsy shoe soles are inadequate protection to factory floors littered with broken glass, nails, or hot or jagged pieces of metal. Toes are not protected by patent leather coverings, when they are hit by lumps of steel or razor-edged tools. Sir George said: "The clog and the stout boot have been discarded, and all too frequently last year's Sunday-best shoes are thought adequate for wearing out in the factory. This is the height of stupidity."

—From *New York Times*, October 28, 1954.

Enlightened Self-Interest

SUPPORT of medical education by corporations is enlightened self-interest of the highest order. By helping strengthen the medical schools, industry is not only indicating its interest in the welfare of the community and the people but is also reinforcing its contributions to voluntary hospitals and community health agencies. A gift to the Fund (National Fund for Medical Education) not only helps to protect a vital national resource but also guarantees full value for industry's local health dollar.

—COLBY M. CHESTER.

Good Question

I READ of a man in business who was troubled by government regulations and shortages and controls and all the dislocations and labor troubles, and he finally got such a bad case of insomnia worrying about his affairs that he went to his doctor and said, "Doctor, I have just got to have some help; I've counted sheep, done all the things I ever heard of and I can't get my rest; won't you give me twilight sleep?" The doctor said, "No, that's for labor." The business man said, "Isn't there anything for management?"

—From "A Country Doctor in Washington," by Honorable WALTER H. JUDD, M.D., Member of United States Congress from Minnesota, in *Nebraska State M. J.*, November, 1954.

Turn It Around

LET THE patient use the stethoscope, doctor, not to listen to your rales, but the better to hear your advice with, if he is hard of hearing. So reports Steine (GP, 9:15, March, 1954) who found that a great deal of wear and tear on his voice and his nervous system could be avoided in this way when he visited elderly patients. It was then possible for the physician to speak in the usual conversational tone of voice, directly into the diaphragm of the stethoscope, and be heard by all patients except those with severely impaired hearing. The idea is not

Founders of the counseling service to the medical profession, serving medicine with distinction over half a century.

SITUATIONS WANTED

Medical Director (a): Seven years, Medical Director, one of country's leading metal fabricating companies; past two years Medical Director, major petro-chemical company; prefers manufacturing plant assignment; well-qualified in industrial hygiene.

Medical Director or Assistant Director (b): Foreign Class "A" graduate; M.P.H., University of Pittsburgh; will soon complete Doctorate, Public Health; outstanding experience in industrial medicine and P.H.; licensed, Pennsylvania; Ohio (pending).

Medical Director (c): Recognized specialist in chest diseases, currently Medical Director, 1200 bed hospital and faculty member important medical school prefers Directorate, large industrial medical program; early 40's; recommended.

Medical Director (d): Outstanding man able to plan, organize and direct medical service any size industrial plant; past 14 years, Medical Director, semi-heavy metal fabricating company; valid cause for relocating; early 40's.

Associate Medical Director (e): Since 1939 has been medical director of fairly large plant which has recently closed; in late 40's this fine man, well-experienced in all phases of industrial medicine should prove valuable as Chief physician to any company with multiple plant operations. Prefers to remain in New England.

Staff (f): Single; 32; M.D., University Pennsylvania; year's residency, internal medicine; one year, medical officer, large industrial medical facility; seeks industrial hygiene or medicine where rigid dietary schedule may be followed.

Staff (g): Woman; M.D., Tufts; M.P.H.; several years, industrial physician, major company; seeks staff appointment with emphasis on medicine; age 33.

SITUATIONS OPEN

Medical Director (h): Nationally recognized plant; new medical department; will replace part time physicians; New England.

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Staff (l): One of country's outstanding industrial medical facilities; about $10,000; several required for New York, Cleveland, Philadelphia; early advancement.

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entirely original with Steine. A well-known Chicago physician was called in consultation to a boiler factory and, in order to make himself heard above the din, reversed his stethoscope. He was thus able without undue effort, to convey what he had to say to the person he had come to see.

—*What's New*, 1954, No. 184.

Industrial Nursing

THE industrial nurse does not often give bedside nursing care but concentrates instead on prevention of illness and accidents. First aid and emergency care, of course, will be among important responsibilities. The nurse's larger task will be the promotion of safe and healthful working conditions for and good working habits of employees. The industrial nurse may be called upon to advise in the placement of handicapped workers, to work out a plant safety program in cooperation with the engineers, to see whether it is possible to find the reason for one worker's frequent absenteeism, or to counsel and help a worker's family. Industrial nurses today work not only in factories, but in big companies, department stores, and other organizations employing a large number of workers. Business and industry realize that such an investment in the positive health of their employees pays dividends.

—From "Careers in Nursing," National League for Nursing, New York.

Fellowships

THE INSTITUTE of Industrial Health of the University of Cincinnati will accept application for a limited number of Fellowships offered to qualified candidates who wish to pursue a graduate course of instruction in preparation for the practice of Industrial Medicine. Any registered physician, who is a graduate of a Class A medical school and who has completed satisfactorily at least two years of training in a hospital accredited by AMA may apply. (Experience in private practice or service in the Armed Forces may be substituted for one year of training.) The course consists of two years of intensive training in Industrial Medicine, followed by one year of practical experience under supervision in industry. Candidates who complete the course satisfactorily will be awarded the degree of Doctor of Science in Industrial Medicine. Requests for additional information may be addressed to the Institute of Industrial Health, College of Medicine, Eden and Bethesda, Cincinnati 19, Ohio.

This Noisy World

ACOUSTICAL engineering becomes more closely related to individual health and efficiency as the world becomes a noisier place. In this mechanized age, noise has become a recognized cause of nervousness, fatigue, inefficiency and general discomfort. To counteract

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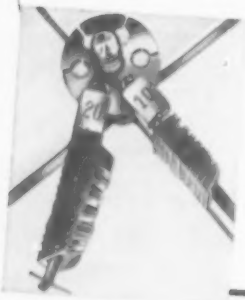
2 The New
6 ARM, RACK-PACK STAND—which serves as permanent equipment, and fits the B-P Blade Jar. It meets hospital O. R. requirements for a larger "on-hand" selection of ready-to-use RIB-BACK blades.



3 The New
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this, noise abatement campaigns have been tried, with some success in some cities. But some noise is necessary. Babies will cry, no matter how sternly one enjoins them to "pipe down"; the most patient of drivers will find at least some occasions when a toot of the horn is preferable to a smash-up, and nobody has yet devised a way to dump coal, feed chickens, or operate machine shops without stirring up a certain amount of noise. Hence, where noise abatement campaigns leave off, acoustical engineers take over to create and install devices that will blot out the noises. The challenge of din has produced acoustical tile, the best-known type of which is a perforated 12 in. by 12 in. square of wood or cellulose fibers. The function of this tile is to absorb sounds which would ordinarily reverberate off hard smooth surfaces. It is the reverberation of ordinary sounds which creates nerve-shattering din and clatter. This tile has enabled train announcers in large railway stations to speak intelligently. Without it, their words echo and re-echo until they reach the ears of listeners as stentorian double-talk. In New York, open telephone booths lined with this tile have been set up in the middle of subway platforms, "islets of quiet in a sea of noise." In Marion Pennsylvania, the authorities sound-conditioned the dog pound, making it possible for nearby residents to sleep at night without an accompaniment of inharmonious yaps. The value of din-blotting to individual efficiency is shown by the example of the office force of a large insurance company, which, it was found, made 25% less errors after the place was sound-conditioned. Now the home, too, is coming in for acoustical attention, particularly in such nerve-jangling spots as the kitchen with its pots and pans, the laundry with its whirring appliances, and the rumpus room with its yelping children by day and gabbling adults by night.

—*Health*, September-October, 1954.

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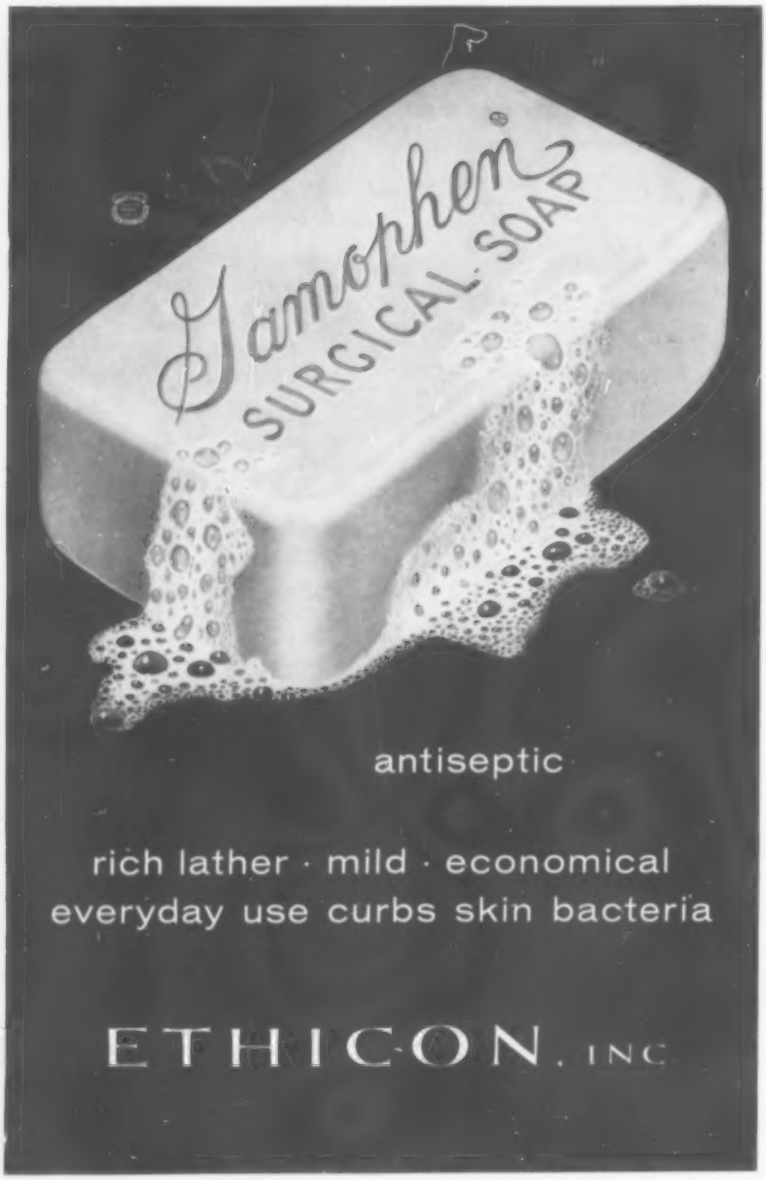
Techniques for Tension

NOTING that the world, in its current condition, gives rise to a sense of insecurity and anxiety, the United Nations is doing something about it. It can't give relief to the world or the nations thereof, but it can cure up the fortunate neurotics in U. N. itself, and this it is doing. The U. N. mental health program for staff members is in the hands of Dr. Frank Calderone, who says his wards frequently exhibit "such neurotic signs as worry, depression, and physical symptoms like gastric ulcers and skin rashes." The doctor professes to have cured numerous cases of anxiety by careful case-finding techniques and a little patience. His methods are instructive. In dealing with a case load of 50 men and women, employed by U. N. and complaining of various things, Dr. Calderone caused a party to be thrown for them, with the results that "nobody has been back to see us since." Then there was the case of another woman employee who had developed a neurotic pattern of behavior. Discovering that she was about to leave for a vacation on Cape Cod, Dr. Calderone wired the chamber

of commerce there and had her met by a brass band. "She came back here a changed woman," he says. We do not see why these techniques should not be given a wider application. Most of us are occasionally given to fits of insecurity, anxiety, and melancholia when moved to think of the hydrogen bomb or a global war with communism. We might be much benefited if a brass band were to greet each of us as he steps off the bus for work. If this therapy is not possible on so extended a scale, how about turning out a brass band for Vishinsky when he turns up at U. N. to make another speech? And perhaps a little party now and then for Secretary of State Dulles might help him overcome his tensions. There is nothing wrong with the world that a good feeler of head bumps couldn't cure, and for the underprivileged who can't get their psychiatric care from U. N. there is always the inexpensive Coue cure, consisting of convincing yourself that every day in every way the world is getting better and better.

—Editorial, *Chicago Tribune*, October 25, 1954.



Industrial Medicine for Nurses

THE INSTITUTE of Industrial Medicine of the Post-Graduate Medical School, a unit of New York University-Bellevue Medical Center, in cooperation with the New York Industrial Nurses' Club, is again offering a course in Industrial Medicine for Nurses. The course, a continuation rather than a repetition of the 1954 course, will be held from March 1 through March 31, on each Tuesday and Thursday night, beginning at 7:00 P.M. Subjects to be covered will include recent advances in surgery and medicine; emergency treatment; pharmacology of new drugs; problems of the aging; emotional problems of workers; workmen's compensation and other legal problems; counseling and health education; nutrition; industrial hygiene methods and their application to plant safety; rehabilitation; dermatology; and the interpersonal relations of the nurse in industry. Apply through the Office of the Dean, New York University Post-Graduate Medical School, 500 First Avenue, New York 16.

Miner's Combat Fatigue

MANY coal miners with respiratory disorders also are suffering from emotional stress much like combat fatigue. So said four Cincinnati psychiatrists and physicians in *J.A.M.A.* for October 2, 1954. The physicians studied 40 men who apparently were incapacitated by shortness of breath, coughing, chest pain, and "smothering." More than half were suffering from emotional as well as physical disorders, and about a third from emotional difficulties alone. Although all were unable to work, many might return to mining if helped. Others could do non-mining work if they could be made to understand the reason for their troubles and realize that mining is not their only possible occupation. The physicians said the development of emotional and respiratory disorders was easy to understand from

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Young internist, insurance company, New England, to $10,000.

the life history and circumstances of the men. Most of them had "worked hard in over-compensation for childhood deprivations." They had been over-solicitous for other miners and other members of their families, in trying to make up for childhood rivalries and for guilty feelings about surviving while other miners died. After deaths, accidents, or narrow escapes, they unknowingly began to fear mining hazards while denying the fear even to themselves. When they developed respiratory ailments and were told by a physician that they had a physical disease, they unconsciously hid behind the disease symptoms to avoid further risk. However, this did not really help because without jobs they had no way to work off their aggressive feelings about mining and miners, which were the root of the whole problem. The life story of the miners began with money difficulties and resulting poor education, hard work, fighting among brothers and sisters, and death in the family. The men started to work in their teens and helped raise younger brothers and sisters, or married and had children of their own to support. Later they felt bitter because they missed opportunities others had enjoyed, but they worked hard to give their children better lives than their own. They managed to hide their fears while living through explosions and falls that killed or maimed friends. Sometimes after a useless attempt to save a worker, or after

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removing a body and notifying the family, the men had nightmares and woke up choking, short of breath, and weak. When first seen by physicians and psychiatrists, the miners studied were from 36 to 64 years old, had been having respiratory symptoms for three to 10 years, and had not been working for one to two years. Many were helped by the U.M.W. welfare fund, but were unhappy about being jobless. They might have done other jobs but didn't understand their problems and were convinced that mining was their only suitable work. They were much like "a combat veteran in war who has 'had it' after prolonged battle stress and deaths of 'buddies,' but who could, nevertheless, be rehabilitated for noncombat duty or civilian life by psychiatric treatment and therapeutic occupation." Although being out of the mines relieved the men's anxiety about accidents, they felt insecure without jobs, and had lost their only outlet for aggressive feelings. As a result they became more depressed and more incapacitated. The physicians made several recommendations for medical and social means to stop the pattern of "incapacity, unhappiness and nonproductivity." Improvement in mine safety, which they feel would help, is being worked on. Physicians should recognize the importance of emotional factors and treat them before returning to mine work becomes "out of the question." Miners could be helped in the same way as battle casualties due to emotional fatigue. However, "employers and unions have

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a responsibility for opening up earlier opportunities for treatment and for rehabilitation at less hazardous occupations if improvement in medical care is to result in solution . . . of the problem," they said. "Finally, an educational program among miners concerning the psychological and physiological reactions to the stresses of their occupation would help to reduce the disabilities that are developing at present." The report was made by Drs. W. Donald Ross, Lee H. Miller, M. Halbert Leet, and Frank Princi, of the University of Cincinnati College of Medicine and the Cincinnati General Hospital.

—American Medical Association News Release.

Rest May be Harmful

WORK, even hard work, is good for a person, while rest may be damaging. This idea, bound to be unpopular in some quarters, comes from Dr. W. Melville Arnott, Professor of Medicine in the University of Birmingham, England. Work got its bad name, he states, because it includes, or has included in the past, an element of exploitation. Toiling for 70 or 80 hours a week in the "dark satanic mills" of the last century was harmful, he agrees. However, when a claim is made that to work for more than 40 hours per week in a modern factory or shop is unhealthy, no one is really expected to believe that it is the work itself that hurts. "Such a claim," he says, "is merely a move in the complex adjustment of remuneration, the setting of the dividing line between normal and overtime rates." None of the known effects of works, he states, can harm healthy tissues. On the contrary, all the effects are good in the sense that they develop and extend the range of adaption of physiological mechanisms. Rest, on the other hand, can produce profound and damaging changes. Blood circulation, blood vessels and kidneys show these effects. Muscles lose their tone, ligaments stretch, and joints get out of position from long rest in bed. Appetite fails and constipation is common, showing the effects of bed rest on the digestive system. Even the skin may show damage, with bed sores developing at pressure points. Doctors are getting away from the idea that sick people must stay in bed except during the acute state of the sickness.

—*Science News Letter*, August 7, 1954.

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Staff Physician: South. Large manufacturing company. Plants in all parts of country. Maintain extensive medical program. Duties limited to in-plant care of employees. Excellent medical facilities $10,000 minimum to start. (IM-2207)

POSITIONS WANTED

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Medical Director: (SN-105) Age 47. University of Michigan. Has specialized in Industrial Health Administration. Twenty years experience mostly in administrative capacity.

Staff Physician: (RD-106) Age 32. Marquette University Medical School. Eligible for American Board of Physical Medicine; also well trained in Public Health. A man who intends to make his career in field of industrial medicine. Will go anywhere.

Industrial Surgeon: (ME-107) Age 45. Certified in surgery. Intensive industrial experience. Several years Medical Director medium sized plant. Exceedingly well qualified man.

Staff Physician: (MS-108) Age 28. M.D. degree. Louisiana State University. One year general practice residency. Excellent references. Definitely wants to make a career in industrial medicine. Prefers South or Southeast.

Staff Physician: (GL-109) Age 35. Eight years successful private general practice; prefers industrial medicine. Has had good training in internal medicine. Prefers Middle West.

Medical Director: (MK-110) Age 48. Surgeon. Has set up and directed to successful consummation several medical programs for industrial companies and has had published articles in this field. Excellent medical background.

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1. Vainder, M.: Indus. M. & S., 22:183, 1953

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[1]*Jl. Inv. Derm.*, 17:125 (Sept., 1951)

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REFERENCES: 1. Brit. M. J. 1:1223 (May 29) 1954. 2. M. Times 81:41 (Jan.) 1953. 3. J. Am. Pharm. Assoc., Sc. Ed. 39:21, 1950. 4. Ind. Med. 20:480 (Oct.) 1951.

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1. Hild, A. M.: Schweiz. med. Wchnschr. 71:557, 1941.
2. New and Nonofficial Remedies, J. B. Lippincott Co., Philadelphia, 1953, p. 200.

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